Construction Plastics Initiative

Findings from a pilot study examining the recovery, recycling, and circular potential of construction-phase plastics in Metro Vancouver

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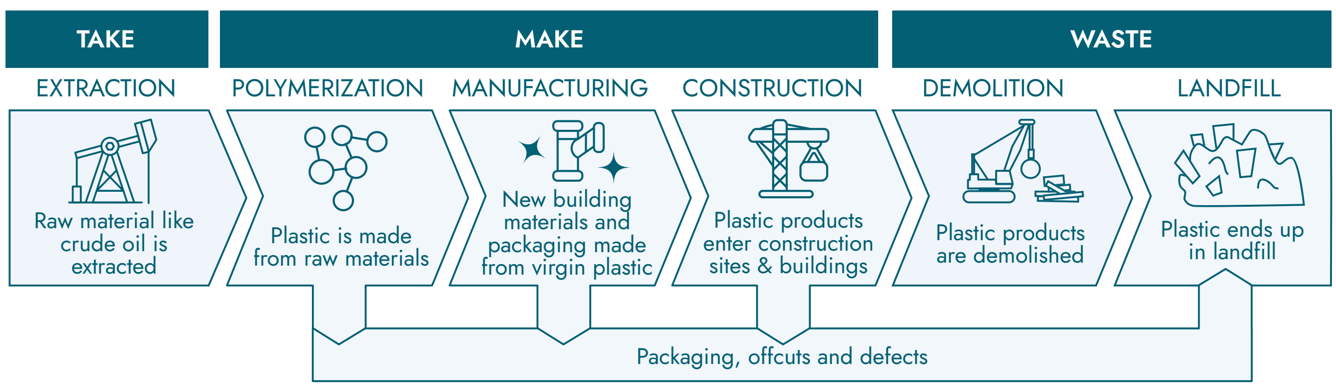
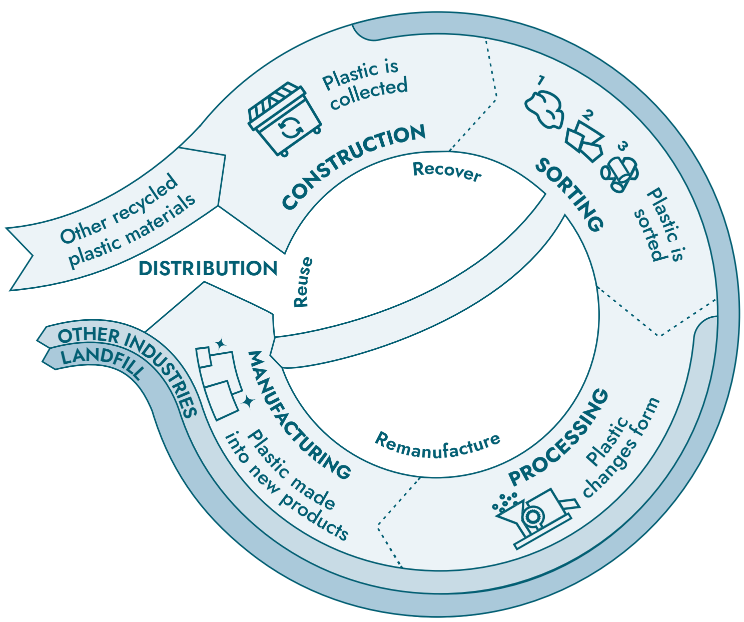
Executive Summary

Canada introduced 7.1 million tonnes of plastic into the domestic market in 2021, of which construction-related products, excluding packaging, accounted for 22.3 per cent. In addition. European studies indicate that as much as 80 per cent of plastics generated from construction are packaging. Yet plastics generated during construction remain poorly understood and largely undervalued, often buried within commingled waste streams and broader building material categories. This lack of visibility has made it difficult to determine the scale of the problem, identify the most recoverable materials, or design practical interventions.

The Construction Plastics Initiative (CPI) was undertaken to address that gap by producing site-level evidence from active construction projects in Metro Vancouver and by testing whether a more circular approach to construction-related plastics is technically, operationally and financially feasible in practice. In most cases, these materials continue to move through a linear system in which products are manufactured, used briefly, and discarded.

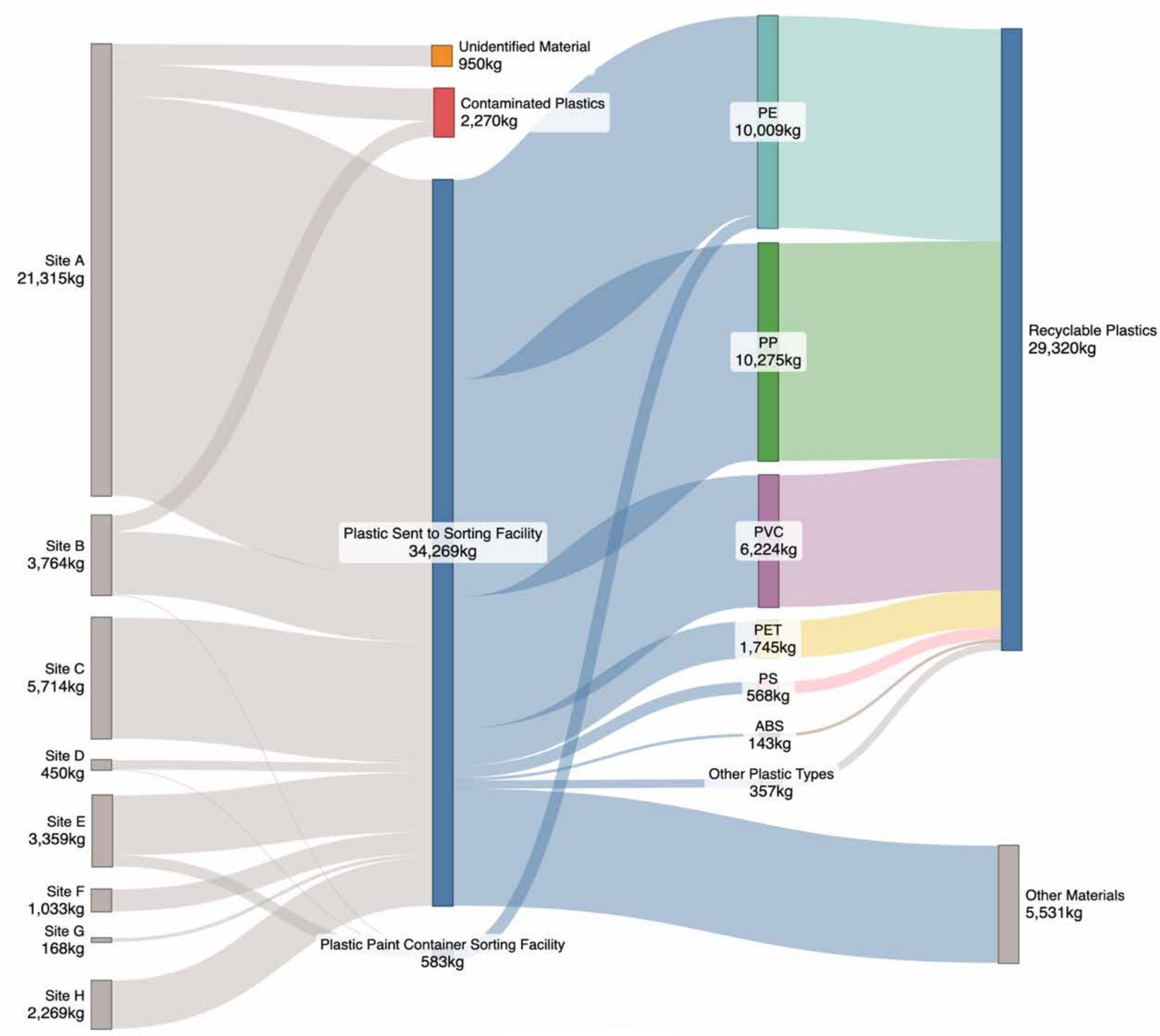


CPI was designed as a pilot program to test whether a more circular approach could be established for construction-related plastics in Metro Vancouver by improving collection, tracking, sorting, processing, and reintegration into manufacturing.

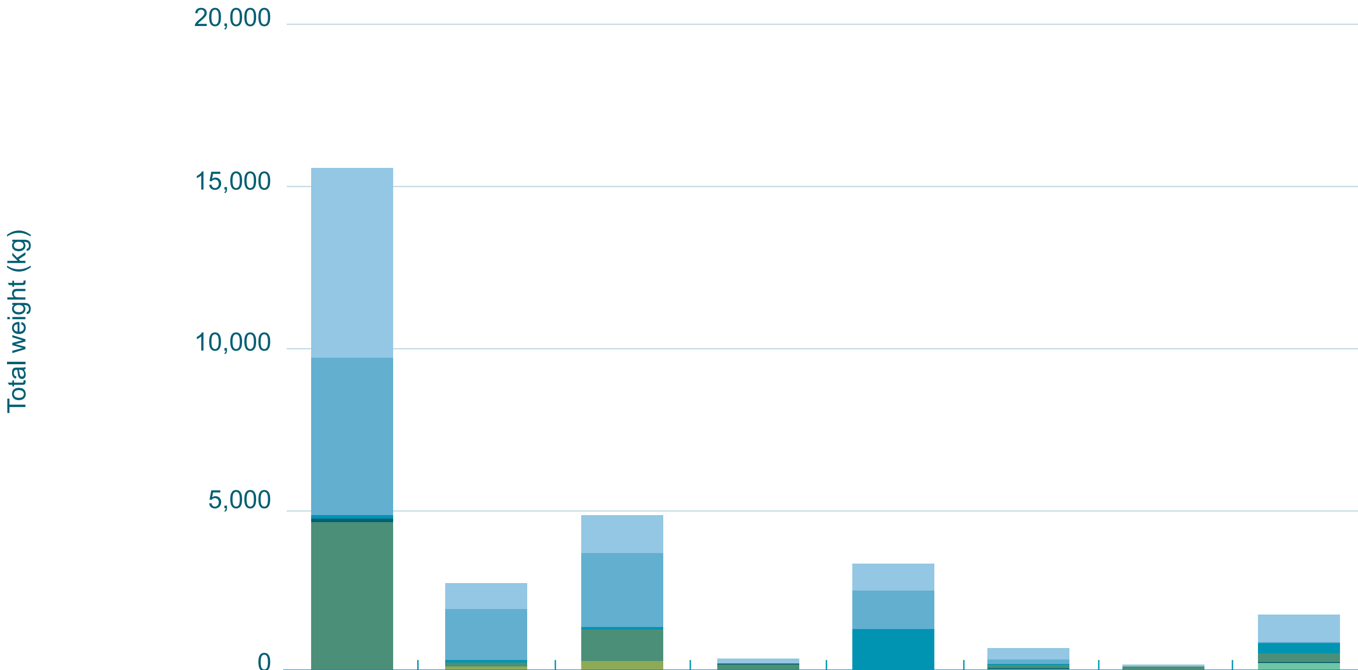


To explore that question, Light House worked with eight active construction sites over a fourteen-month period. The study tracked material from job sites through hauling, sorting, storage, processing, and manufacturing, while also documenting the operational conditions that affected recovery. The intent was not to produce a definitive account of all plastics generated across the construction sector, but rather to test the practicality of a circular value chain under real-world conditions and to identify significant opportunities and constraints. As such, the findings should be understood as evidence from a pilot program involving participating projects with differing characteristics, construction methods, and project phases, rather than as a complete representation of sector-wide conditions.

Even with those limitations, the study offers valuable insight into the types and quantities of plastics generated during construction and the extent to which they may be recoverable. CPI collected 77 loads representing 38,070 kg of construction-derived plastic. Of the 34,268 kg sent for sorting, 29,319 kg, or 77 per cent, was classified as recyclable.



The material profile suggests that the clearest near-term opportunity lies in relatively clean, homogeneous plastic packaging and protection. Films, wraps, strapping, geotextiles, and similar materials accounted for a substantial share of the plastics observed across participating sites. By resin type, polyethylene, particularly low-density polyethylene (LDPE) associated with soft plastic films and sheeting, was the most significant category across the study, followed by polypropylene (PP). PVC also represented a notable share by weight, though less by volume because of its density, while PET and other resins were present in smaller quantities. These patterns indicate that a limited number of recurring material streams account for much of the recoverable plastic generated during construction. At the same time, the pilot makes clear that technical recyclability does not in itself ensure practical recovery.



	Site A	Site B	Site C	Site D	Site E	Site F	Site G	Site H
PE	5,902	792	1,148	143	814	367	11	832
PP	4,862	1,634	2,356	6	1,252	119	0	46
PET	60	44	51	0	1,236	32	2	321
ABS	136	7	0	0	0	0	0	0
PVC	4,552	135	974	173	0	108	0	282
PS	20	92	266	33	0	0	155	2
Other Plastics	19	20	12	0	0	70	0	236

Contamination averaged 21 per cent by weight across participating projects and was shaped by a range of site conditions, including project stage, weather, loading practices, bin placement, and the degree of oversight given to separation systems. In some cases, contamination appeared to result less from confusion about acceptable materials than from convenience and competing site pressures. Smaller mixed plastics, plastics combined with tape or other materials, and plastics generated during excavation or erosion and sediment control activities proved especially difficult to manage cleanly. By contrast, sites with visible leadership, repeated communication, and more deliberate collection practices generally achieved better outcomes. The study therefore suggests that good system design that aligns with how construction sites actually function is critical to achieve effective source separation.

CPI also tested whether construction-derived plastics could move beyond collection and sorting into actual manufacturing applications. A representative sample of LDPE from lumber wrap and PP from clear poly sheeting was mechanically processed into pellets, and the LDPE was successfully incorporated into a construction product. This manufacturing trial showed that integration is possible, but it also underscored the importance of scale, resin-specific pathways, and end markets that can accommodate some variability in feedstock. Generally, findings suggest that a circular value chain for construction-related plastics may become increasingly feasible where enabling conditions are in place, including clearer material identification, better aggregation of material, more targeted collection systems, stronger processing capacity, and more robust end uses for recycled plastic.

Taken together, the report concludes that construction-related plastics merit more focused attention within circular economy efforts than they currently receive. The pilot initiative shows that a meaningful share of plastics generated during construction can be recovered under the right conditions, particularly where the emphasis is placed on cleaner packaging-related streams and on system design that reflects operational realities on site. It also shows that important barriers remain, especially in relation to contamination, handling, processing capacity, and market development. For that reason, the principal contribution of CPI is not to present a fully proven model, but to clarify where the strongest opportunities appear to exist, where the main points of failure arise, and what kinds of coordinated action would be needed to move construction-related plastics closer to a genuinely circular system. To that end, the report concludes by offering 27 recommendations to support a transition to a more circular economic model for managing plastics in construction.

1. Introduction

1. Introduction

The Plastic Waste Problem

Plastics are deeply embedded in modern economies posing a systemic global environmental challenge. In Canada, an estimated 7.1 kilotonnes (kt) of plastic were introduced into the domestic market in 2021.[1] Yet, the plastics economy remains predominantly linear with only 26.5 per cent of all plastic discarded in Canada diverted for material recovery, 5.3 per cent recycled (primarily PET from beverage containers), and essentially none of it from the construction sector.[2] A significant portion of plastics end up in landfills and other environments where they are continually degraded by physical and chemical processes leading to production of microplastics that pose a risk to ecosystems and human health.[3] Environment and Climate Change Canada estimates that unrecovered plastics represented a lost economic opportunity of $7.8 billion in 2016.[4]

Plastics in the Construction Sector

Construction, renovation, and demolition (CRD) activities account for approximately one quarter of all material disposed in landfill facilities nationally, positioning the construction sector as a major contributor to regional disposal pressures and a priority area for intervention.[5] Within the broader discussion around CRD waste, plastic waste from the construction sector has received comparatively little attention and comprehensive data on the generation and diversion of plastic waste in construction remains sparse.

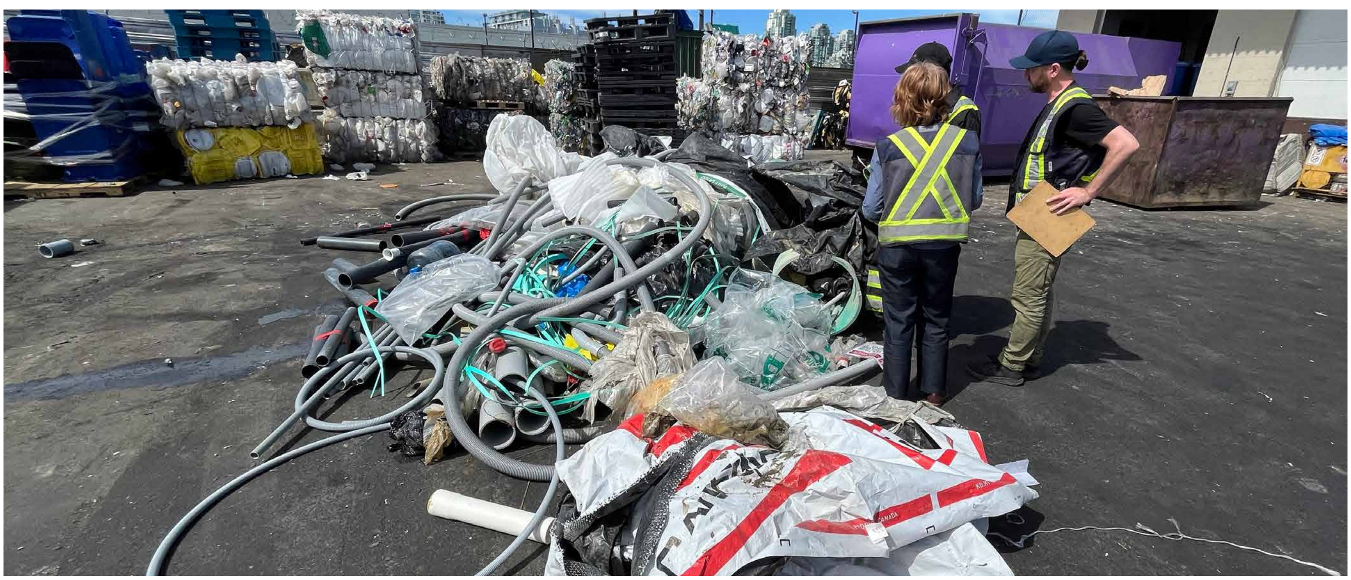


Figure 1: Random plastics collected from a construction site.

1 Statistics Canada. [(March 12, 2025). *Physical flow account for plastic material, 2021*]().

2 Deloitte. (2019). *Economic Study of the Canadian Plastics Industry, Markets and Waste*.

3 Mohammad Toha, R-Rafiul Rahman, Mahbub Alam. (June 2025). "Microplastics in waste management systems: An invisible threat to environmental and public health." *Biosource Technology Reports, 30*.

4 Deloitte. See note 2.

5 Light House Sustainability Society. (2020). *Watching Our Waste: Analysis of Material Waste from LEED-Certified Projects in Canada.*

According to Statistics Canada, construction-related products (not including packaging) accounted for 22.3 per cent (1.583 kt) of plastic entering the Canadian market in 2021, including domestic production and imports, with a large portion embedded in buildings themselves as piping, insulation, membranes, and plastic components within assemblies.[6] An earlier study suggests that approximately five per cent of that material ends up directly as waste.[7] This includes offcuts, damaged materials, and unused plastic products that are discarded during installation. These post-industrial materials may be recyclable in theory, but in practice are often mixed with other waste streams, making recovery difficult.

European studies, supported by findings from this research, indicate that recyclable plastic packaging associated with the construction sector represents as much as 80 per cent of all construction-related plastic.[8] Construction materials, particularly prefabricated components and mass timber elements, are commonly delivered wrapped in plastic film to protect against moisture, UV exposure, and damage during transport and on site. This single-use packaging is typically removed shortly after delivery, generating large volumes of clean, plastic waste at construction sites.

Light House's *Watching Our Waste* study observed that plastics are frequently embedded in commingled waste streams, inconsistently tracked, and poorly understood compared to materials such as wood, concrete, drywall, and metal.[9] National plastics flow studies similarly show that while construction is a major end-use market for plastics, only a small share of plastic waste generated in construction is currently captured in national datasets, making it difficult to confirm the scale of the problem or to advance targeted interventions, while reinforcing the tendency for construction-related plastics to be overlooked.[10] Furthermore, CRD waste characterization studies visually assess waste samples to estimate material types and weights resulting in a high degree of subjectivity and considerable variation across studies, and plastics derived from CRD activities are often subsumed under the broader category of ICI waste.[11] Construction and demolition waste characterization studies from different regions across Canada that do isolate plastics report they represent anywhere from six per cent to as much as 20 per cent of all landfilled CRD materials.[12,13] In its Circular Economy Roadmap, the Canada Plastics Pact acknowledges the data gap, calling for improved tracking, pilot programs for plastic reuse, and better collaboration with manufacturers.[14]

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6 Statistics Canada. See note 1.

7 Deloitte. (2019). See note 2.

8 G Santos, E Esmizadeh, M Riahinezhad. (2024). "Recycling Construction, Renovation, and Demolition Plastic Waste: Review of the Status Quo, Challenges and Opportunities." *Journal of Polymers and the Environment,* 32, 479-509.

9 Light House Sustainability Society. (2020). See note 5.

10 Deloitte. (2019). See note 2

11 Environment and Climate Change Canada. (2020). *National Waste Characterization Report: The Composition of Canadian Residual Municipal Solid Waste*.

12 Dillon Consulting. (2023). *Metro Vancouver 2022 Construction & Demolition Waste Composition Study* (10.3%); Recyc-Québec. (2023). *Étude de caractérisation des matières résiduelles acheminées à l'élimination* (6.1%); ECCC, see note 11 (Appendix B – Alberta – 12.9%); Tetra Tech. (2017). *2017 Waste Composition Study – Cowichan Valley Regional District* (20.9%).

13 Statistics Canada. Table 38-10-0032-01 Disposal of waste, by source; Statistics Canada. Table 38-10-0138-01 Waste materials diverted, by type and by source, inactive. National data on plastic waste report CRD plastic as part of all non-residential sources of plastic waste (including all industrial, institutional and commercial sources) making it challenging to isolate and estimate national CRD plastic waste values. Statistics Canada estimates 976,000 tonnes of non-residential plastic waste was generated in 2022. This does not include diverted volumes of non-residential plastic waste, which is not reported. Non-residential plastic waste that was diverted represents only one per cent of all waste diverted and less than 0.28 per cent of all waste generated in Canada.

14 Canada Plastics Pact. (2021). *Roadmap to 2025: A Shared Action Plan to Build a Circular Economy for Plastics Packaging*.

The Construction Plastics Initiative

Light House initiated the Construction Plastics Initiative (CPI) in 2024 in response to the growing recognition that plastic waste from construction, renovation, and demolition (CRD) activities contributes to the broader global plastics crisis, yet remains largely overlooked in policy and practice. With attention focused primarily on residential consumer packaging and single-use plastics, CPI was conceived to address this blind spot and to situate construction-related plastics within the wider challenge of reducing plastic pollution, improving material circularity, and limiting the long-term environmental impacts associated with plastic production and disposal.

Accordingly, the specific objectives of CPI are to:

- Identify the amount and type of plastic material generated from construction sites in Metro Vancouver;
- Demonstrate the potential for a financially self-sustaining circular economic model to support the diversion and reuse of select plastic resins from construction projects, including plastic collection, sorting, hauling, processing, and manufacturing of new products from processed plastics;
- Address the lack of data on plastic waste generated from construction, renovation and demolition activities and explore ways to best capture this data;
- Identify the requirements for tracking and reporting on plastics entering and leaving construction sites to inform reporting requirements under the Federal Plastics Registry; and
- Provide industry-informed recommendations to support reductions in construction-related plastics, and the diversion and recycling of plastics generated during construction at scale.

To achieve these objectives, CPI established a framework for diverting and tracking all plastic waste generated from eight active construction projects in Metro Vancouver and then processing selected resins for reuse in new products. CPI worked directly with general contractors, waste haulers, plastic processors, and plastics manufacturers across the region to document plastic outputs, pilot collection and sorting approaches, and demonstrate the potential value chain for reclaiming and reusing plastics from construction projects. By combining onsite data collection with processing trials and manufacturer engagement, CPI assesses what is technically and economically feasible today, where bottlenecks exist, and which plastics show the greatest potential for reintegration into local manufacturing.

Light House’s Role and Work to Date

CPI builds on six years of construction waste research led by Light House. In 2020, Light House published *Watching Our Waste*, which analyzed waste diversion data from 690 LEED-certified construction projects across Canada. That study provided one of the most comprehensive national datasets on construction material flows and showed that plastics were among the least consistently tracked and understood material streams, despite their environmental significance.

As a precursor to CPI, Light House produced the *Construction Plastics Initiative Benchmarking Study*, analyzing plastic diversion data from 253 LEED-certified projects completed between 2009 and 2019. The study established a national baseline for plastic diversion intensity and identified differences by building type, province, and year of completion. It also highlighted systemic reporting challenges, including the routine inclusion of plastics in commingled waste streams and inconsistent tracking practices across projects.

Against this backdrop, the Construction Plastics Initiative moves beyond high-level benchmarking and into direct, empirical assessment of construction plastic waste generation, composition, and reuse potential. By combining on-the-ground data collection, material processing trials, and collaboration with downstream manufacturers, CPI seeks to generate actionable insights that can inform future diversion strategies, support policy development, and contribute to the transition toward a more circular construction economy in Canada.

While CPI has ambitious objectives, the study does have limitations. The study explored plastics generation from construction projects only, not renovation or demolition, and covered only parts of project lifecycles due to project time constraints. CPI was also not designed to provide a comprehensive feasibility assessment or full life-cycle evaluation of plastics derived from construction activities. It does not include detailed life cycle assessment (LCA), embodied carbon modelling, or quantitative comparisons with virgin plastic alternatives. The analysis does not extend to a detailed review of regulatory, policy, or planning frameworks, nor does it seek to predict long-term market demand, pricing, or end-market stability for recycled plastic products.

2. Past Research on Plastics in Construction

2. Past Research on Plastics in Construction

Existing research consistently demonstrates that CRD activities are a major source of waste, yet plastic waste within this stream remains poorly quantified and inadequately managed. Across the literature, plastics are shown to be both technically recyclable and systematically overlooked, with limited data, weak market signals, and operational barriers constraining recovery.

At a global level, Santos et al. (2023) provide a comprehensive review of CRD plastic waste management and identify persistent barriers to recycling, including material contamination, sorting complexity, low economic value, and insufficient regulatory incentives.[15] Despite these challenges, the authors report that approximately 80 per cent of plastic waste generated during on-site construction activities consists of clean packaging materials, which are largely uncontaminated and readily divertible.

Canadian research led by Light House provides essential national context for these findings. As noted above, *Watching Our Waste* analyzes waste diversion data from 690 LEED-certified construction projects across Canada, representing the largest project-level construction waste dataset available nationally.[16] While the study provides robust data on materials such as wood, concrete, drywall, and metal, it identifies plastics as a consistently underreported stream. Plastics are frequently recorded within commingled waste categories, preventing reliable estimates of quantities, composition, or end-of-life pathways. Although plastics comprise a relatively small share of construction waste by weight, the study highlights their disproportionate environmental impact and the lack of consistent tracking as a fundamental barrier to improved management

Building on this foundation, Light House's *Construction Plastics Initiative (CPI) Benchmarking Study* analyzes plastic waste diversion intensity (kg/m^2) for 253 LEED-certified projects completed between 2009 and 2019.[17] The study finds statistically significant differences in plastic diversion intensity[18] by building type, region, and year, and reports that across building typologies the average plastic waste diversion intensity ranges from 1.1 to 2.7 kg/m^2, with institutional and residential projects showing significantly higher diversion intensities than educational projects. The report explicitly cautions that summary statistics can obscure this dominant clustering pattern and proposes that the long tail may reflect inconsistent inclusion of demolition waste in LEED reporting (which can inflate kg/m^2 when demolition waste is included but floor area reflects new construction).

International and site-based studies provide more granular insight into plastic types and volumes. Berry et al. (2022) audited plastic waste from four active construction sites in Auckland, New Zealand, and found that polyethylene (PE) accounted for approximately 77 per cent of plastic waste by mass, followed by polyvinyl chloride (PVC) at approximately 19 per cent, with remaining polymers comprising a small residual share.[19] Plastic waste originated from packaging, building protection materials, and plastic componentry in roughly comparable proportions, challenging the findings of Santos et al. (2023) that packaging defines the construction plastics problem. The study also demonstrated that plastic generation varies by construction stage, with later stages producing higher volumes.

15 G Santos et al. See note 8.

16 Light House Sustainability Society. (2020). See note 5

17 A. Lopera-Valle and G. Yaron. (2025). *Construction Plastics Initiative Benchmarking Study*. Light House Sustainability Society.

18 "Plastic diversity intensity" represents the amount of plastic diverted from landfill and may not reflect the entire amount of plastic waste generated on a project.

19 T-A Berry, J K Low, S L Wallis, L Kestle, A Day, G Hernandez. (2022). "Determining the Feasibility of a Circular Economy for Plastic Waste from the Construction Sector in New Zealand." *IOP Conference Series: Earth and Environmental Science*, 1122(1), 012002.

Low et al. (2025) extend this work through a detailed audit of six new-build construction sites in Auckland, collecting and characterizing 7.2 tonnes of plastic waste.[20] The study reports an average plastic waste intensity of 0.61 kg/m^2 of floor area, with soft plastics constituting the largest share by mass (33 per cent in the aggregated results reported), followed by pipes (HDPE and PVC) (22 per cent), and additional streams including shrink wrap and woven building protection materials that account for substantial shares at specific sites. Consistent with earlier studies, the majority of plastic waste was generated during the final stages of construction. In comparing findings, plastic diversion intensities reported by Light House from LEED projects in its *Construction Plastics Initiative Benchmarking Study* are significantly higher than that reported by Low et al. for Auckland construction projects. The discrepancies may be attributable to the differences in the types of construction projects in each study and the differing durations of both studies, but it is notable that LEED projects in Canada did report higher plastic diversion rates than non-certified projects in New Zealand.

Across these studies, several common opportunities and challenges emerge. On the opportunity side, the literature consistently identifies clean construction-phase plastics, particularly packaging films and protective wraps, as the most feasible targets for diversion. Where plastics are source-separated by function and polymer type, studies demonstrate substantially higher diversion rates and clearer pathways to recycling and remanufacturing. On the challenge side, low material value, limited end markets for flexible plastics, space and labour constraints on construction sites, and weak policy signals continue to undermine recovery in favour of disposal. These challenges are echoed across Canadian and international contexts, suggesting systemic rather than site-specific barriers.

Taken together, this body of research strongly supports the objectives of the Construction Plastics Initiative. While construction-related plastics are generated in predictable quantities, at identifiable stages, and are at least partially recyclable with existing infrastructure, they remain largely unmanaged due to data gaps and structural constraints. CPI directly responds to these findings by generating primary site-level data in Canada, trialing enhanced material characterization and handling techniques, and testing practical pathways for salvaging and recycling plastic waste from construction projects.

20 J Low, S Berry, G Hernandez, P Thomson, G Steinhorn, H Waghela, C Briggs, C Berry, A-T Berry. (2025). "Comprehensive Plastic Waste Characterisation to Enhance Landfill Diversion in New Zealand's Construction Industry." Sustainability, 17(6), 2742.

3. The Circular Economic Value Chain for Plastics

3. The Circular Economic Value Chain for Plastics

Construction-related plastics in Canada are currently managed within a largely linear economic model characterized by extraction, production, (short-term) use, and disposal (see Figure 2). Virgin plastic resins are manufactured primarily from fossil-fuel feedstocks, in particular as a side product from oil and natural gas processing, and converted into a wide range of construction products and packaging, including protective films, strapping, wrap, piping, insulation components, and composite materials. Due to limited onsite sorting, inconsistent recycling options, and a lack of dedicated downstream infrastructure, essentially all plastic generated on construction sites is disposed of as mixed CRD waste and sent to landfill or waste-to-energy. Even where recycling is technically possible, economic signals generally favour disposal, as waste management costs are considered lower than the costs associated with separation, storage, and transport to specialized recyclers. Within this linear system, the environmental costs of plastic production and disposal, including greenhouse gas emissions, resource depletion, and long-term pollution, are largely externalized, while the material value of plastics is lost after a single use.

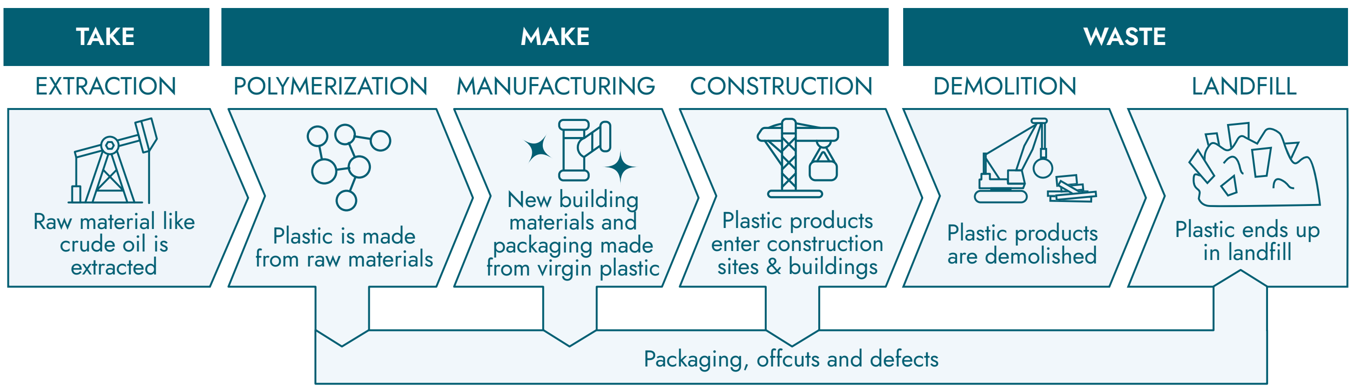


Figure 2: Current linear construction plastics value chain

A circular economic model creates a value chain for construction-related plastics; fundamentally restructuring the linear system by treating plastics as recoverable resources rather than disposable by-products (see Figue 3). In a circular model, upstream decisions prioritize material choices, product design, and packaging formats that reduce material requirements and ensure plastics that are used are compatible with reuse and recycling. Manufacturers design products and packaging to limit use of hard-to-manage plastics and prevent contamination of single-use plastic packaging with hard-to-remove labels and other contaminants. Contractors apply procurement practices that ensure the most efficient use of purchased materials and minimize packaging. On construction sites, plastics are intentionally separated, kept clean, and aggregated in sufficient volumes to support efficient collection. Downstream, dedicated processing infrastructure converts recovered plastics into post-consumer recycled feedstock that can displace virgin resin in new construction products or other plastic applications. This approach retains material value within the economy, reduces demand for fossil-based inputs, and lowers lifecycle greenhouse gas emissions. Unlike the linear model, a circular system requires coordination across the value chain, including manufacturers, builders, waste service providers, and policymakers. CPI explicitly maps this value chain by following plastics from construction sites through to manufacturing, generating the data and insights needed to understand where current linear practices break down and how circular pathways for construction-related plastics can be practically and economically enabled. A central tenet of CPI is to ensure the circular economic framework developed is financially self-sustaining.

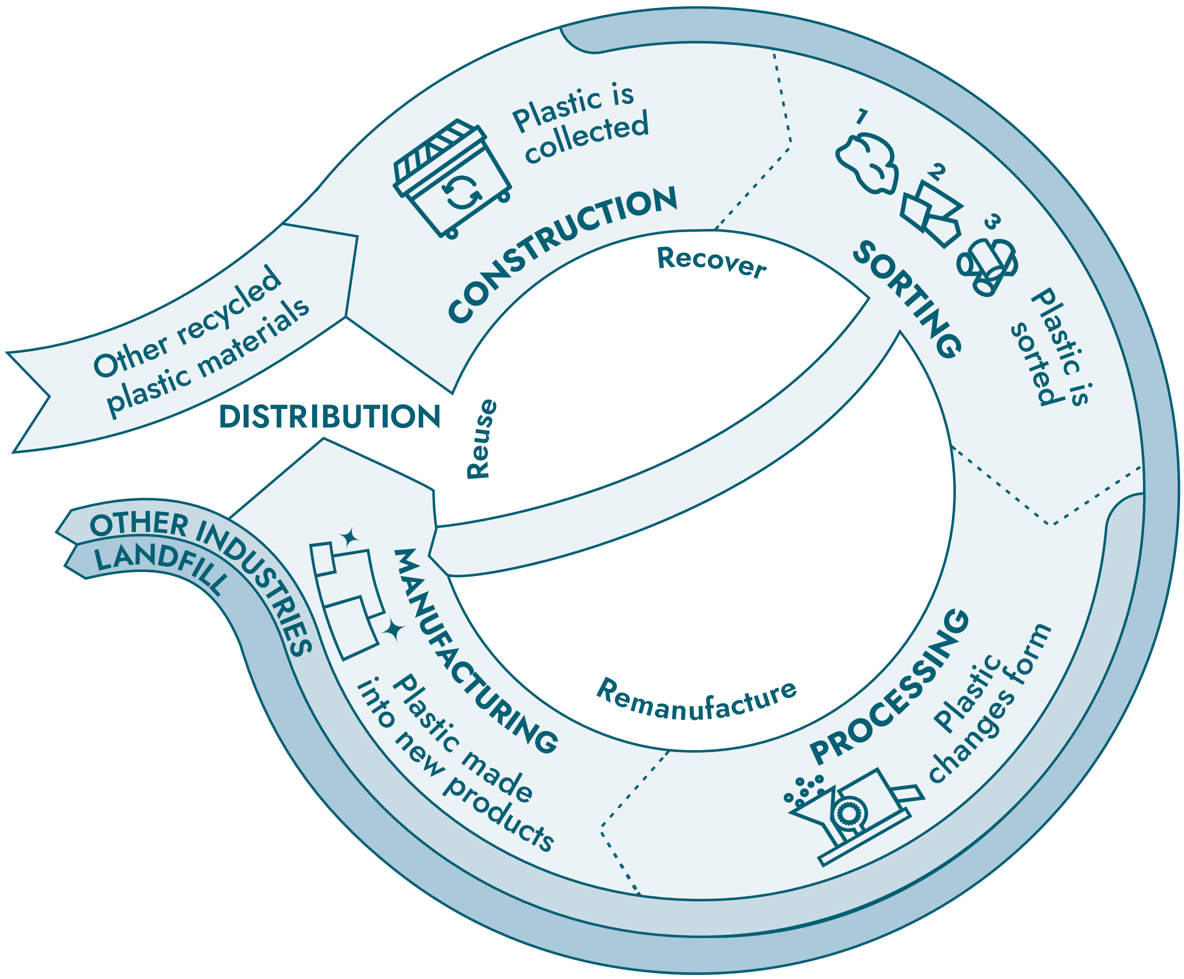


Figure 3: The circular economic value chain for construction-related plastics

4. Methodology

4. Methodology

The objective of CPI is to design and demonstrate the viability of a circular economic model for construction phase plastics, focusing on the design of a downstream solution for diverting, processing and integrating plastics into the manufacturing of new products. The initiative was structured around a six-stage value chain comprising collection, hauling, sorting and storage, processing, manufacturing and reuse. As a pilot project, the program also incorporated extensive material and process tracking at every stage to quantify the amounts and types of plastic waste generated on construction projects and to explore the opportunities and challenges of material tracking at scale, supporting anticipated reporting requirements under the Federal Plastics Registry.

4.1 Selection of Participating Construction Sites

The project sought to engage ten similar projects under construction in Metro Vancouver during the project's timeframe (September 2024 – December 2025). Construction sites were identified and recruited through a combination of online expressions of interest submitted via the CPI website, responses to outreach through professional networking platforms, targeted review of development permit applications, and direct engagement through Light House's industry networks. In total, CPI approached 64 developers and construction management companies across Metro Vancouver. From this pool, ten construction projects were selected to participate based on alignment with CPI's timeframe, site location, availability of space for onsite collection infrastructure, demonstrated interest in participating, and overall economic feasibility. All ten construction projects were onboarded and engaged in the initiative; however, due to significant delays in construction schedules, two projects were ultimately unable to participate. Eight projects proceeded with onsite bin placement and active collection of plastic materials.

Figure 4: Plastics bin on construction site

Table 1 provides details about each of the eight participating construction projects, including building type, type of project, primary construction technique, size, project duration, period of time plastic was collected, number of loads collected and the construction stages during which each project participated. Each site was assigned a site ID with location and contractor information removed.

Initially, the intention was to identify similar projects to allow for comparability. However, the ultimate list of participating projects ended up representing a range of different projects, dictated by market conditions. As such, the findings are from a participant-ready set of projects and are not necessarily representative of the broader construction sector.

Of the eight participating projects, four were institutional, three were commercial and one was an infrastructure project. Three of the institutional projects were new builds and all of the commercial projects were tenant improvements affording some degree of comparison.

Table 1: Participating construction project details

Site Identifier	Building Type	Project Type	Primary Construction Technique	Size (sq m)	Project duration (months)	Plastic collection (months)	Plastic loads collected	Project Stage				
								Excavation	Foundation	Structure / Framing	Enclosure	Finishes
A	Institutional	New build	Mass timber	11,776	25	14	28	X	X	X		X
B	Institutional	New build	Steel frame & CLT	5.607	50	8	13			X		X
C	Institutional	New build	Mass timber & steel frame	4,840	23	8	16			X	X	X
D	Institutional	Prefabricated Building addition	Wood frame	873	9	3	1					X
E	Commercial	Tenant improvement (TI)	n/a	35,814	22	5	6					X
F	Commercial	Tenant improvement (TI)	n/a	13,935	17	6	7					X
G	Commercial	Tenant Improvement (TI)	n/a	919	6	7	1					X
H	Infrastructure	New build	Concrete	n/a	33	8	5	X	X			

4.2 Collections

Each construction site was given a single dedicated bin for all plastics to simplify material separation requirements for crews and to align with existing hauling infrastructure and operational practices. Plastic bins had signage affixed to clearly distinguish them from regular waste containers (see Figure 5). Across participating projects, 20-yard bins were determined to be the most practical size for routine plastic collection. These provided adequate capacity without requiring excessive space and aligned well with typical site logistics. During periods of heightened plastic generation (such as framing or major material deliveries) some sites temporarily increased bin size to 30 or 40-yard bins to accommodate larger volumes and avoid increases in hauling frequency. Due to space constraints, sites E, F and G did not keep a bin on site and used live loading instead.

Figure 5: A plastic collection bin with signage

In addition, separate collection totes were provided to collect plastic paint containers through BC's extended producer responsibility program for paint and paint containers operated by Product Care Recycling. Collection totes were placed at three of the participating sites (Site B, D and E). The remaining five sites did not use paint container collection totes either because they were not at a project phase involving painting, or because they did not want to have a separate container on site.

Figure 6: Tubskids used for collecting paint containers[21]

Participating construction teams including hundreds of staff were onboarded through an initial training session delivered by Light House's dedicated site monitor, who introduced the purpose and objectives of the program, outlined permitted and prohibited materials, and stressed the importance of avoiding contamination. For sites with higher turnover of sub-contractors and crews, site-level management was trained and then they provided training to crews as needed.[22]

Educational resources and signage were provided and displayed on bins and on job site bulletin boards. Sorting guides were developed and distributed in English, French, Chinese, and Spanish reflecting the linguistic diversity of construction crews (see Appendix B: Program Overview for Construction Sites).

Two primary collection approaches were used across the program: conventional bin hauling and live loading. For sites using live loading (Sites E and F), collection followed standard waste management practices. Site staff put plastics into small bins located through the job site and notified the site monitor when a bin was full.[23] At that point, the bin's contents were taken and deposited in a holding area on a different floor. When a sufficient volume was reached, a hauler was scheduled and plastics were loaded directly into the truck by hand at the time of arrival.Site superintendents were responsible for notifying the site monitor when bins were ready for collection. To avoid contamination, site superintendents were requested to photograph bin contents prior to pick up and to visually assess contamination levels. Based on this information, the site monitor determined whether a load should be transported to the sorting facility or sent directly to landfill because it was too contaminated. This quality control measure was implemented to avoid financial and operational risks associated with transporting and sorting heavily contaminated loads that were unlikely to be recoverable.

To enhance quality control and support continuous improvement, the site monitor conducted regular visits to participating construction sites to assess bin contents, make adjustments to collection practices, and offer feedback to site teams. In addition, a project newsletter was established to share updates, highlight sorting best practices, identify common contamination issues, and circulate relevant resources and media about the project.

The study also allowed and encouraged Site Superintendents and crews to pre-screen loads and send heavily contaminated loads directly to the landfill before sorting. Some sites also had additional pre-sorting or simply avoided putting plastics that were likely not recyclable into the bin at all. As such, the pilot program tested a managed collection model employing best efforts, not pure business-as-usual waste management practices.

21 Image provided courtesy of Product Care Association of Canada.

22 Some CSOs / safety coordinators were provided with digital slides (PowerPoint) to include in their standard site orientation presentations, while others preferred to reference paper copies.

23 One potential risk associated with live loading is that when bins are full, site crews will deposit plastics with general waste. Due to communication challenges with site crews, it was unclear how much, or if any, plastic made it past the designated plastic bins and into general waste containers.

4.3 Hauling

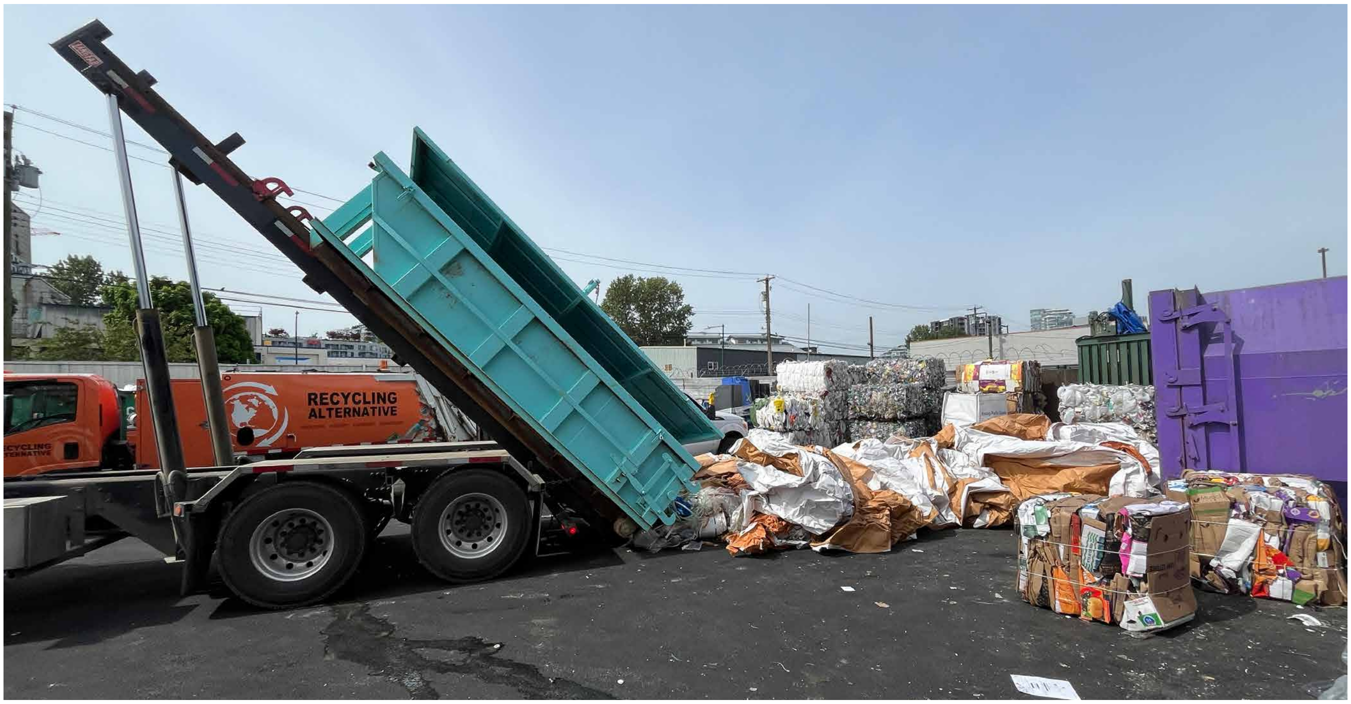


Figure 7: Hauler dropping plastic at a sorting facility

General contractors for each participating project were encouraged to engage their preferred hauling contractors in order to simplify contract administration, maintain continuity of service, preserve existing relationships, reduce hauling distances and encourage circular practices within the hauling industry. Where a participating project did not have a designated hauler, Light House recommended a designated hauler selected based on operational suitability for the pilot.

Haulers collected plastic loads from construction sites and delivered them to the designated sorting facility. To maintain parity with market conditions, all parties agreed to a tipping fee of $195 per tonne to haul plastic loads to the sorting facility, reflecting landfill disposal rates in Metro Vancouver. This fee was billed by haulers to construction management companies along with standard monthly bin rental charges.

4.4 Sorting and Storage

Initially, the project was designed for materials to be received, sorted and processed at the same location. However, due to unforeseen issues with initial project partners, sorting and processing had to be separated and conducted at different locations, resulting in the need to bale materials for efficient transport between the sorting facility and the processing facility. Subsequently, the selected sorting facility had to exit early as a result of unanticipated renovation activities that limited their space to operate. Given the limited options available in the Lower Mainland, Light House established and operated a dedicated sorting and storage facility for the latter phase of the project. These modifications added significant costs to the initiative and necessitated that plastics be baled once sorted to facilitate transport to the processing facility. It is assumed that while baling plastics might be required when recycling plastics at scale, the added costs associated with sorting and processing materials at different facilities would be avoided making material handling more efficient.

Figure 8: Sorted plastic in megabags

Upon receipt at the sorting facility, loads were manually sorted according to resin types, including HDPE, LDPE, PE, PP, PET, PVC, PS, ABS, other plastic types, and unaccepted material. Each material stream was placed into large bags ("bulk bags", "mega bags", or "super sacks") and weighed. Data regarding material type, weights and sorting time were recorded manually and subsequently entered into a centralized data tracking tool.

Figure 9: Map of Participating Construction Sites, Waste Haulers, Processing and Manufacturing Facilities

4.5 Processing

Plastic processing under CPI was largely dictated by the technical and operational requirements of the end product being manufactured and the specification of the plastics manufacturer. The product that CPI identified to be made from the diverted plastic is manufactured using an injection molding process requiring feedstock in pellet form. Consequently, CPI identified a mechanical plastics processor – Ocean Legacy Foundation - with extrusion capabilities, the technical capacity to handle construction plastic waste, and experience working with potentially contaminated materials.

Figure 10: Pelletized plastic from construction sites

Given limited resources, only a small amount of the two most prevalent material types collected were processed (LDPE lumber wrap and LDPE white construction film), sufficient enough to be blended with virgin plastic to manufacture the end product.

As with all feedstock, the two batches of processed plastics were subjected to material performance testing to determine material specifications, including flexural modulus, melt flow, and impact analysis. Based on these results, the plastics manufacturer identified white construction film as the preferred material for incorporation into their product.

4.6 Manufacturing

CPI engaged six product producers to explore end-use applications for plastics recovered from construction activities. In selecting the preferred product, CPI considered the manufacturer's proximity to the Lower Mainland, experience working with post-consumer recycled plastic and product tolerance for varying levels of purity, willingness to pay for post-consumer material, ability to accommodate CPI's timelines, and the relevance of the manufactured product to the construction industry. Given these considerations and constraints, the most viable product was InfinaTec's InfinaNet™ – a construction void technology made from HDPE using an injection molding process with a degree of tolerance for different plastic resin types and contamination — and their plastics manufacturer, Plascon Plastics. Very small amounts of plastic were also given to another manufacturer to manufacture planter containers and to an artist to incorporate into their art fabrication projects.

Plascon's role extended beyond simply manufacturing the final product and included technical collaboration related to material processing and the evaluation of recycled feedstock in injection molded applications.

Figure 11: InfinaNet™ — a construction void technology

4.7 Data Tracking & Measuring Impact

Based on the existing infrastructure for sorting and processing plastics in the Lower Mainland, diverted materials were grouped into four categories for tracking purposes, including "recyclable plastics", "contaminated plastics", "unidentified material" and "other materials" (see Table 2).

Table 2: Material Categories

Material Category	Description
"Recyclable plastics"	Plastic resins with properties that allow them to be recycled, including PET, PS, PP, HDPE, LDPE, ABS, PVC, Nylon, BOPP, Acrylic, PC, XLPE/PEX and mixed resins.
"Contaminated Plastics"	Plastics that were so contaminated with non-plastics that they were sent directly to landfill.[24] Only total load weights were recorded. No information about material types or weights was collected for these loads.
"Unidentified Material"	Loads of materials collected that were sent directly to landfill due to logistical constraints. Only total load weights were recorded. No information about material types or weights was collected for these loads.
"Other Materials"	Generally non-plastic materials, including wood, cardboard, metal, glass, hazardous materials, food or organic waste. This category included small quantities of plastic, including contaminated or dirty plastics, adhesive and sealant tubes, electrical wire and cables, and small format plastic considered too laborious to sort.

A centralized data tracking tool was developed to capture and manage all information collected through CPI. Developed in collaboration with Environment and Climate Change Canada, the tool was created, in part, to support the anticipated future phase reporting requirements of the Federal Plastics Registry and to test the feasibility of collecting certain data from construction sites. Table 3 identifies the fields of data that were collected at each stage in the value chain.

24 Plastics in the contaminated loads sent direct to landfill included: PVC pipe, black LDPE ground cover, HDPE buckets / safety cones, misc. LDPE films & lumber wrap, crumbled PS, and a mix of others.

Table 3: List of data points collected in each stage of the value chain

Stage	Data Points Collected

Collection	• Photos of plastic bin contents
	• Qualitative notes on:
	  • Construction partner barriers to participation
	  • Reasons for participation
	  • Management structures and their impact on workforce motivation and contamination levels
	  • Attitudes towards plastic waste diversion and their change across the project
	  • Site conditions
	  • Challenges and points of friction with collection

Hauling	• Load collection dates • Construction phase • Observed contamination types based on visual review of photographs and site monitor inspections • Transport fees • Tipping fees • Landfill diversion events, including dates, quantities (kg) and associated costs
Sorting	• Date received at the sorting facility • Quantities of HDPE/LDPE, PP, PET, PVC, PS, ABS, other plastic types and unaccepted material (kg) • Total load weight • Contamination notes • Photos • Qualitative notes on material composition, labour time and related costs

Processing	• Material performance test results (flexural modulus, melt flow, and impact analysis)
	• Processing costs and labour (hrs)
	• Qualitative notes on:
	  • Processor barriers to participation
	  • Reasons for participation
	  • Contamination tolerances
	  • Shredding, densifying and pelletizing challenges

Contamination levels were calculated by comparing the amount of Contaminated Plastics and Other Materials to Recyclable Plastics in each load. Total project contamination was calculated as the proportion of Contaminated Plastics and Other Materials relative to the total plastic generated from participating construction sites.[25]

Sorting time and cost per kilogram of plastic were calculated using labour records from 67 sorted loads. Total sorting labour time and costs were each divided by the total weight of the 67 loads to determine average sorting time and cost to sort per kilogram respectively. Product Care Recycling provided data on plastic paint containers collected.

4.8 Cost Analysis and Revenue Model

A central premise for CPI was to develop a model that is market-driven and financially sustainable. Consequently, the model envisioned each actor in the value chain assuming the costs and realizing the revenues associated with plastics diverted from the construction sites. General contractors pay the same fees they would normally pay for waste collection services. The receiving processor receives those fees and also receives the profits from the sale of the processed plastic to the plastics manufacturer. The plastics manufacturer pays the cost for the plastic and receives the revenues from the sale of the manufactured product to end markets.

4.9 Project Constraints

The timeframe of CPI limited the ability to track plastic waste over the entire timeframe of each construction project. Figure 12 shows the construction timelines for each project and the period during which plastics were collected.

Projects varied widely in scale, construction methodology, materials, timelines and duration of plastic collection relative to overall project delivery. For example, Site A was a large scale, 25-month amphitheatre project where plastic collection occurred for over half of the construction period, while Site D was a short-duration prefabricated school addition where plastic collection occurred for approximately three months of a nine-month project. Differences of this nature materially affected both the quantity and type of plastics generated and captured. Consequently, the ability to compare plastic generation across projects was limited.

25 A small amount of small format plastic considered too laborious to sort was included under the 'other materials' category. This was minimal by weight.

		2024											2025											
Site	**Stage**	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Site A	Excavation										X													
	Foundation & Footings										X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Framing & Structural											X	X	X	X	X	X	X	X	X	X	X	X	X
	Finishes										X	X	X	X	X	X	X	X	X	X	X	X	X	X
Site B	Excavation																							
	Foundation & Footings																							
	Framing & Structural													X	X	X	X	X	X	X	X			
	Finishes																							X
Site C	Excavation																							
	Foundation & Footings																							
	Framing & Structural																X	X	X	X	X			
	Enclosure																				X	X	X	X
	Finishes																				X	X	X	X
Site D	Excavation																							
	Foundation & Footings																							
	Framing & Structural																							
	Enclosure																							
	Finishes																		X	X	X			
Site E	Finishes																			X	X	X	X	X
Site F	Finishes																		X	X	X	X	X	X
Site G	Finishes																	X	X	X	X	X	X	X
Site H	Excavation																X	X	X	X	X	X	X	X
	Foundation & Footings																X	X	X	X	X	X	X	X

X = Plastic collection through CPI

Figure 12: Construction project timeline

4.10 Site Conditions

In addition to overall project structure and scope parameters detailed in Table 1 and Figure 12 above, site specific operational factors including leadership structures, waste management arrangements, workforce engagement, and local site conditions also influenced the data recorded. These factors are summarized in Appendix A for each participating site and should be considered when interpreting the results presented in this study.

5. Study Findings

5. Study Findings

5.1 Material Collected and Material Flows

Over the fourteen months that the initiative actively collected and tracked plastic, a total of 38,070kg of plastic was generated, representing 77 individual plastic loads and 11 paint container loads collected across the eight participating sites. Of this total, 34,268 kg was sent for sorting and classification of which 29,319kg or 77 per cent was deemed recyclable, while 2,270kg or six per cent (four loads) were sent directly to landfill due to high levels of contamination (primarily associated with Site A and Site C that tracked plastics generated during each project's excavation phase.) An additional 950kg (three loads) was not able to be handled through the program because of logistical issues and was sent directly to landfill due to pressures to have the materials removed from the participating site, preventing resin identification. Consequently, this material was classified as "unidentified material". See Figure 13 for a breakdown of plastics generated.

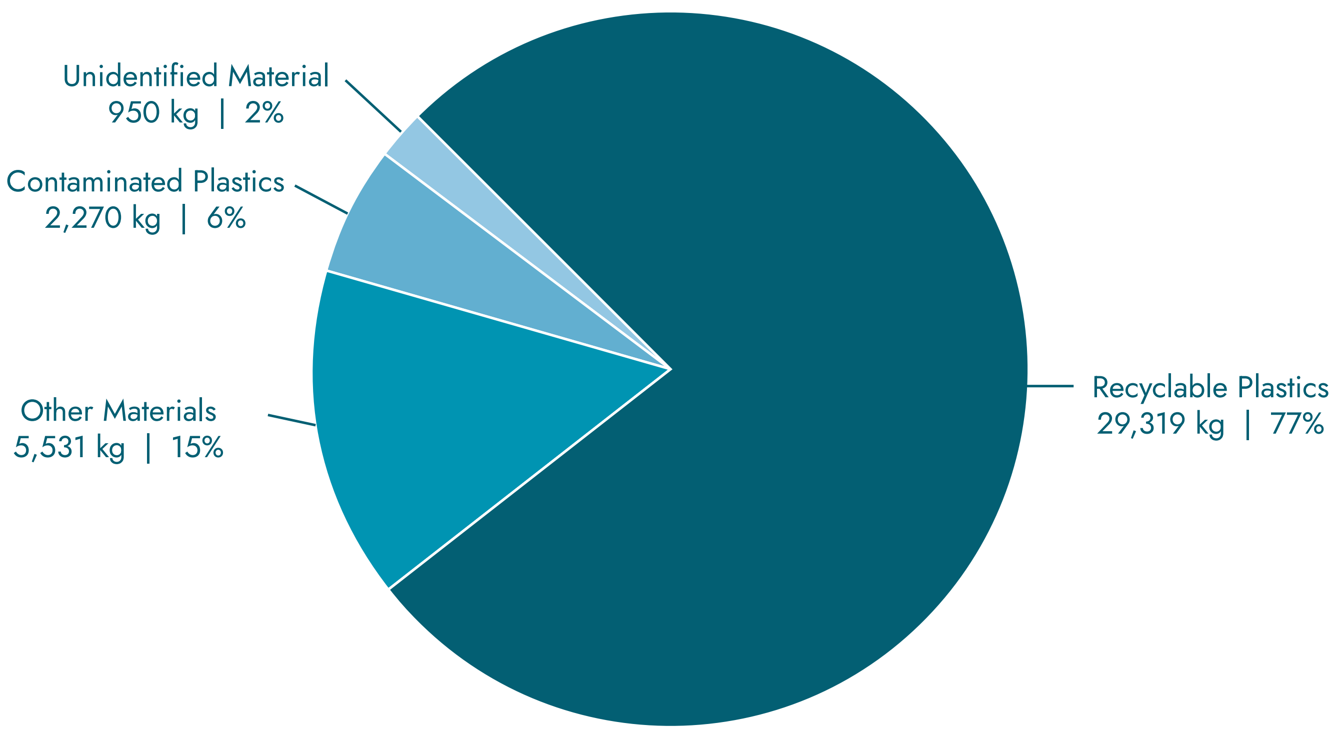


Figure 13: Breakdown of materials in plastic loads across all participating sites (kg)

Figure 14 provides a material flow analysis showing the quantities of plastics generated on each site, the amounts classified as recyclable/contaminated/unidentified, and the breakdown of the resin types deemed recyclable. Polyethylene (PE), including both HDPE and LDPE, and polypropylene (PP) comprised the two largest amounts of plastic by weight. A significant amount of PVC was collected by weight (6,224kg), but this represented a relatively small portion of the total volume of plastics collected given the higher density of PVC. Smaller amounts of PET, ABS and other plastics were also collected. The products and packaging associated with each of these resins are explored in detail in section 5.3 below.

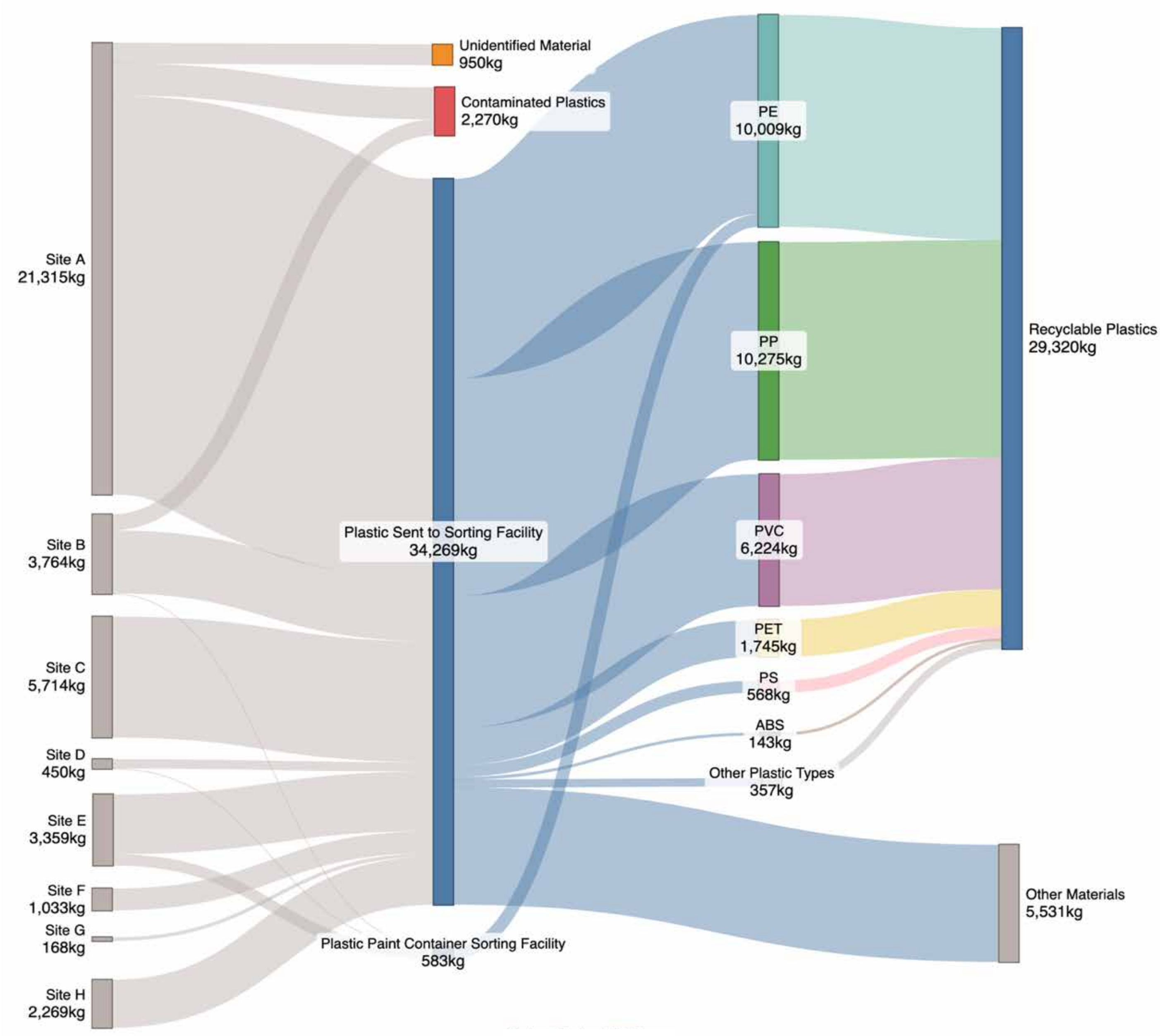


Figure 14: Material flows for participating sites[26]

The information here provides insights into the types of plastic resins generated on the construction sites. However, CPI only tracked plastics for a portion of the duration of most construction projects preventing comparison of the relative amount of different plastic resins generated during the full lifespan of a project or across projects. Further longitudinal studies covering more building typologies is needed to obtain this information.

26 Any differences in total weights are due to rounding errors.

5.2 Materials, Resin Types & Recyclability

Figure 15: Plastic inside a CPI bin on a construction site

Over the course of the initiative, participating projects generated a range of plastic materials, primarily packaging, but also off cuts and used materials. Across the 77 loads collected, the most commonly occurring materials were clear poly wrap, PVC pipe, lumber wrap, pallet strapping, non-woven polypropylene geotextile fabric (TX300), plastic wrap and PET soundboard.[27] Overall, protective wraps and packaging accounted for the majority of plastic volumes, while other products such as strapping occurred frequently but contributed relatively small quantities by weight.

Non-woven polypropylene protective fabric (e.g., TX-300), used as a protective layer around engineered glulam timber at Site A, contributed substantial plastic quantities. Lumber wrap was consistently recorded as a high-volume material at sites A, B and C reflecting its widespread use in mass timber construction. Various other plastic wraps were also major contributors to overall plastic volumes, particularly at sites A, B and C, with additional contributions at Site F. These plastic wraps were typically associated with packaging used for protecting items such as glulam beams (in conjunction with the TX-300 fabric on Site A), other mass-timber elements, large & individually packaged mechanical components, and architectural finishes, among other items. PET soundboard generated at Site E represented another high-volume material, where product offcuts contributed significant weight despite limited quantities.

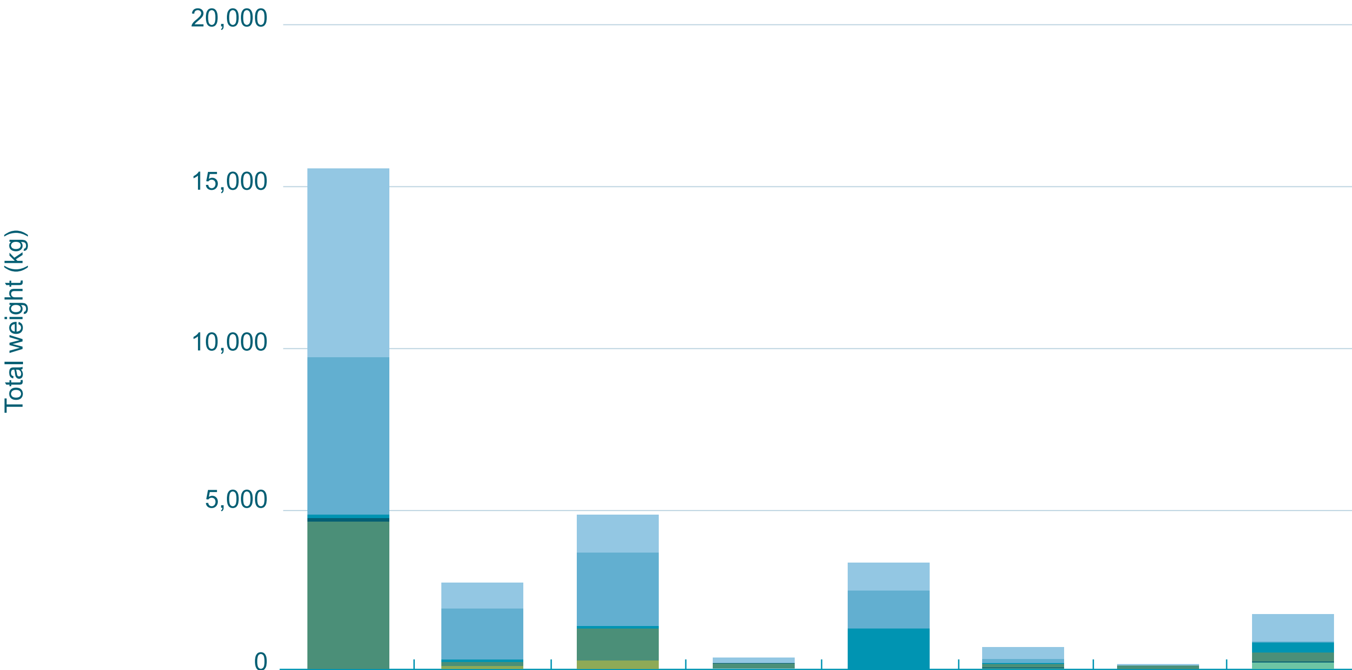
In contrast, several plastic products were observed at high frequency but relatively low individual volumes. Pallet strapping was recorded across multiple sites, including sites A, B, C and F, and appeared consistently at all construction stages. However, individual quantities were small, resulting in a comparatively low contribution to total plastic volumes. PVC pipe appeared frequently, including sites A, B, C, D, F and H, reflecting its widespread use. Table 4 lists the full range of products generated across all participating sites.

27 While technological solutions and automated sorting systems have the potential to improve efficiency, these were not feasible within the scope of the initiative due to cost, scale, and availability constraints. The absence of resin identification tools significantly constrained sorting efficiency. Handheld plastic identification devices were investigated but found to be cost-prohibitive for the project. As a result, sorting relied heavily on visual identification and manual knowledge, increasing labour intensity and the risk of misclassification.

Table 4: Types of Plastic Waste Generated from Participating Construction Sites

ABS	HDPE	LDPE	PP	PET	PS	PVC	Other
Pipe	Buckets	Bags	Corrugated signs	Beverage containers	Insulated concrete forms (ICF)	Conduit	Acrylic
	Containers	Films	Corrugated sheets	Geotechnical turf	Rigid insulation	Connectors	Black rubber strips (from glazing)
	Hard hats	Flexible foam	Dimple board	Plastic mesh	Styrofoam	Fence banners	BOPP
	Packaging	Ground cover (film, poly)	Geo mesh	Slope stabilization nets	Styrofoam corners (packaging)	Pipe & fittings	Cellophane
	Pipe	Packaging	Lumber wrap	Soundboard	Void foam		Nylon ropes
	Safety cones	Poly sheeting	Rebar chairs	Strapping (heavy duty, pallet)			XLPE
	Safety fence	Sill gasket	Strapping				
	Slab sleeves	Tarpaulin sheets	Surface protection				
	Strapping	Wraps (cling, lumber, shrink, pallet, white poly)	TX-300 protective fabric				
	Tool cases		Wire spools				
			Woven bags				

Findings from the study illustrate that plastic products and packaging associated with construction reflect a broad range of resin types (see Figure 15). As noted earlier, polyethylene (LDPE and HDPE) and polypropylene represented the two most common resins, followed by PVC and PET.



	Site A	Site B	Site C	Site D	Site E	Site F	Site G	Site H
PE	5,902	792	1,148	143	814	367	11	832
PP	4,862	1,634	2,356	6	1,252	119	0	46
PET	60	44	51	0	1,236	32	2	321
ABS	136	7	0	0	0	0	0	0
PVC	4,552	135	974	173	0	108	0	282
PS	20	92	266	33	0	0	155	2
Other Plastics	19	20	12	0	0	70	0	236

Figure 16: Total plastic generated by resin type (kg)

PE (LDPE + HDPE)

For the purposes of this study, LDPE and HDPE were managed together under the category of polyethylene (PE). LDPE constituted the largest overall resin category across the study and was present at all sites, primarily associated with soft plastic films such as poly sheeting, shrink wrap, protective packaging, and plastic bags. High proportions of LDPE were associated with sites where timber or glulam materials were prominent or on projects with large quantities of packaging. For example, significant quantities of LDPE were generated at Site A from multi-layer glulam packaging, which included two layers of heavy-gauge poly or shrink wrap. Sites D and F also recorded LDPE as a dominant resin category, reflecting the prevalence of protective plastic films and packaging materials. At Site G, numerous clear LDPE bags and lightweight packaging materials were collected. While the colour of LDPE plastics were not specifically tracked, the vast majority (an estimated 70 per cent) was white mass timber packaging (see Figure 17) approximately one-quarter was clear poly sheeting (see Figure 18) and the remainder was coloured. This is important as clear and white LDPE commands a higher price than coloured LDPE.

HDPE associated with rigid plastic products was observed at comparatively low levels across most projects and project phases. Common HDPE products included buckets, containers, rigid packaging, and some forms of

Figure 17: Plastic wrap (LDPE/PP)

Figure 18: Clear poly (LDPE)

strapping, which were present in small quantities on all sites. Hard hats were recorded on Site E and H, while Site H also had instances of safety cones and safety fencing. Small quantities of slab sleeves and wire spools were recorded from Site D. Ground cover associated with erosion and sediment control (ESC) was typically LDPE, but Sites A and H occasionally recorded HDPE ground cover, which was thicker and more durable.

PP

Polypropylene (PP) was the second most significant resin type and was present across most sites. PP was particularly associated with construction packaging and surface protection products. High volumes of PP were generated at Site A and Site C, where lumber wrap accounted for a substantial proportion of plastic collected. At Site A, PP was predominantly in glulam packaging that included a non-woven PP geotextile layer as part of a three-layer protective system that were easily separable. At Site C, PP surface protection products, such as corrugated protection sheets, accounted for the majority of PP collected.

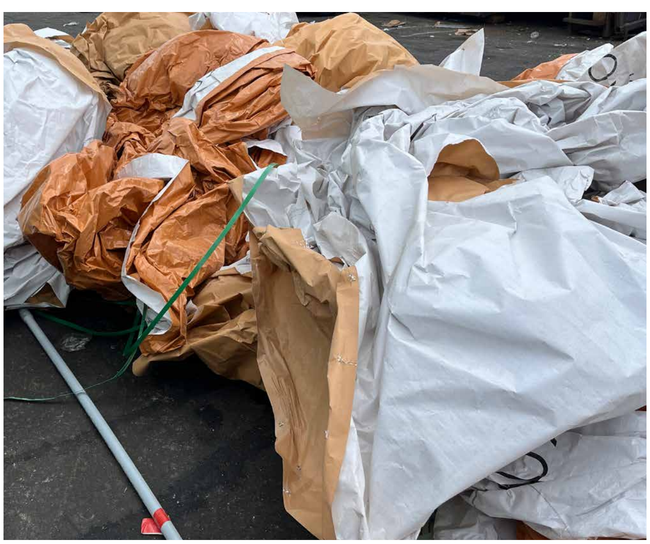


Figure 19: Lumber wrap (PP)

Figure 20: Non-woven polypropylene protective fabric (PP)

PVC

Figure 21: Pipe (PVC)

PVC represented a significant proportion of the overall material collected by weight (17 per cent), however given its high density, generated relatively small quantities by volume. PVC was commonly associated with rigid products such as pipes, fittings, and vinyl offcuts. Significant amounts of PVC were generated at sites A and D, the only two sites that were at the structural phase of construction during the period that CPI was collecting plastics.

PET and PS

PET and polystyrene (PS) were present in comparatively low quantities across most sites. PET was generally minimal, with notable contributions linked to specific products, such as soundboard offcuts at Site E that accounted for approximately 44 per cent of total plastic by weight. While observed in limited amounts across all projects, PS was the dominant resin type at Site G due to the project's use of insulated concrete forms (ICFs). ICF products are comprised of polystyrene combined with other materials, including metal components and mixed resins, making recycling challenging.

Other Plastics

Low levels of other plastics were recorded across projects. As the sole infrastructure project participating in the study, site H generated various geotechnical and erosion and sediment control (ESC) plastics, such as nylon core, not typically seen on other sites.

A central observation was that virtually all plastic collected was technically recoverable, but only a subset was commercially recoverable given the current regional infrastructure in Metro Vancouver, contamination and end-market requirements. In other words, technical considerations are ultimately not the limiting factor in recycling plastics associated with construction activities. The constraints are primarily economic and strategic – what is actually recycled in practice depends largely on cost, collection, sorting and handling practices, and available processing infrastructure. In the case of Metro Vancouver, processing capacity for common resins, including PE

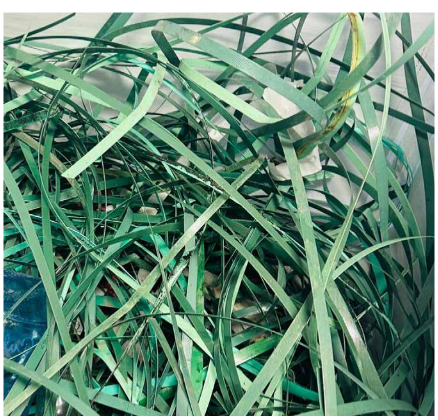


Figure 22: Pallet strapping (PET)

Figure 23: Soundboard (PET)

Figure 24: ICF (PS & PP)

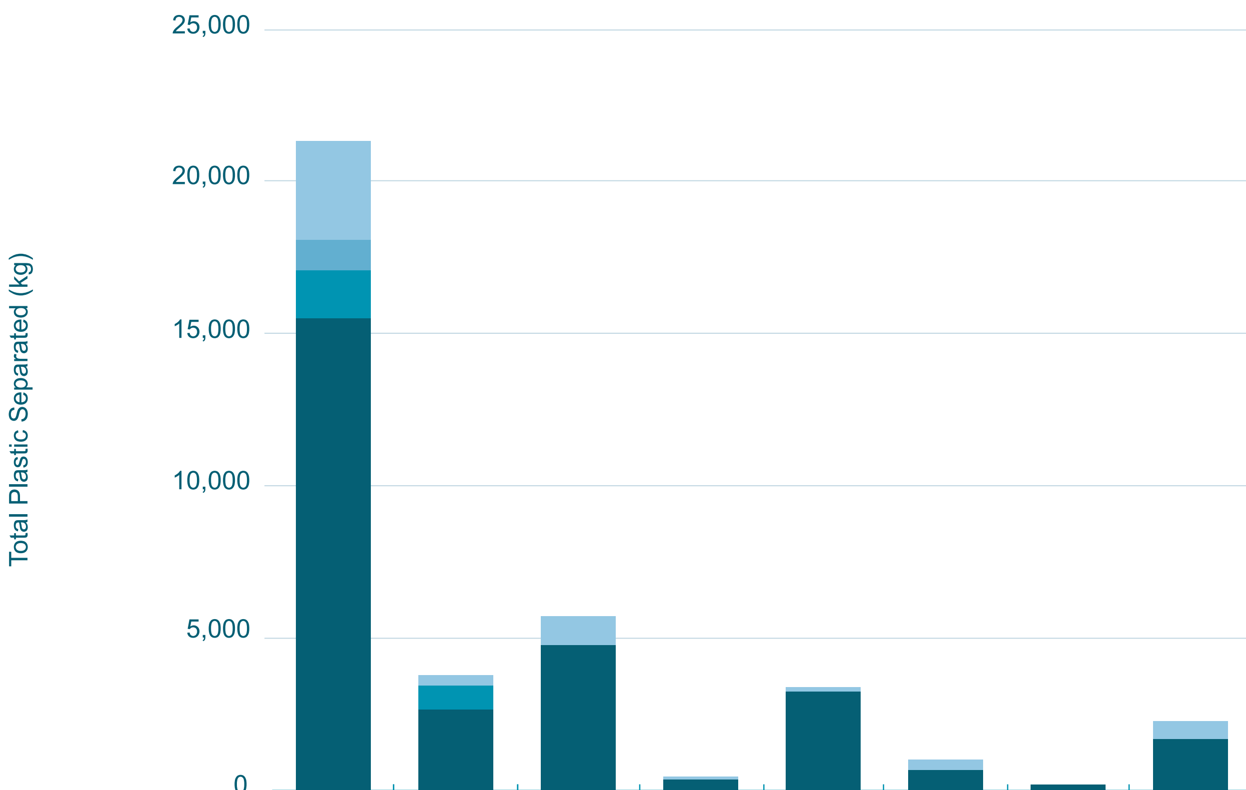
and PP, are growing with several facilities operating across the region. Options are also available for select HDPE and polystyrene; however they were both too costly to use given the small volumes managed through CPI.

The findings demonstrate that construction activities generate large volumes of plastic and a majority of this material is recyclable either now or with future infrastructure, reinforcing the potential for construction-sector interventions to play a major role in reducing plastic waste to landfill.

5.3 Contamination

One of the main concerns associated with the reuse of plastic materials generated from construction sites is contamination. The presence of metals, organics and other materials can damage sensitive processing equipment and reduce the purity of processed plastics rendering them unusable in many applications.

Figure 25 shows the amounts of recyclable plastics, contaminated loads, unidentified materials and other materials. Contamination levels ranged between zero and 33 per cent across the participating sites, a conservative estimate that assumes the categories of contaminated plastics, unidentified material and other materials were all contaminated. Most sites had less than 20 per cent of contaminants in their plastic loads overall by weight.



	Site A	Site B	Site C	Site D	Site E	Site F	Site G	Site H
Other Materials	3,305	280	907	95	57	338	0	550
Unidentified Material	950	0	0	6	0	0	0	0
Contaminated Plastics	1,510	760	0	0	0	0	0	0
Recyclable Plastics	15,550	2,724	4,807	355	3,302	695	168	1,719

Figure 25: Total plastic generated by each participating site by material category (kg)

Based on observations by the site monitor, contamination levels across sites were driven by a combination of project stage, material characteristics, on-site practices, and workforce behaviour. The highest contamination occurred during excavation and bulk earthworks, when plastics—particularly ESC materials such as thick black LDPE/HDPE ground cover observed on Sites A, C, and H—were frequently contaminated with soil, mud, and gravel. At these stages, it was often difficult to keep dirty and clean plastics separate, and machine loading commonly introduced additional debris into bins (e.g., Sites A, B, and C). On large infrastructure works such as Site H, avoiding soil contamination was inherently challenging. These observations suggest it is difficult to prevent contamination during sitework and to avoid contaminating clean plastic, contaminated ground-contact plastics should be managed separately.

Material form also influenced outcomes. Expanded polystyrene presented particular challenges: At Site B, small pieces were bagged in an attempt to contain 'beads', however large pieces also broke down during handling and transport, contaminating loads. Tenant improvement projects (Sites E, F, and G) generated high volumes of small plastic pieces that were too labour-intensive to sort manually, as well as plastics heavily combined with tape -- most commonly tuck tape – which did not significantly affect measured contamination but may create recyclability issues depending on processing capabilities.

Operational factors on site further exacerbated contamination. Examples included plastic bins located adjacent to wood bins and a plastic bin mislabelled as "garbage" (Site A), and the inclusion of wood, metal, and mixed-material items in plastic loads despite opportunities for removal prior to live-loading (Site F). Most sites also contained some garbage in collected loads, indicating the need for closer attention to on-site sorting and additional labour where feasible. Table 5 summarizes the factors observed to influence contamination rates across participating construction sites.

Table 5: Factors influencing contamination rates

Factor	Observations
Bin Placement, Visibility, and Site Layout	Bin location and physical characteristics influenced contamination outcomes across several sites. Where plastics bins were placed adjacent to other waste streams the likelihood of cross contamination increased, particularly where neighbouring bins were taller or mechanically loaded. Limited bin visibility, such as high sided containers, reduced the ability for site staff to easily identify contamination once material had been deposited. In some cases, relocating plastics bins away from other waste streams reduced recurring contamination events.
Mechanical Handling and Loading Practices	The use of machinery to load plastics bins was a consistent contributor to contamination. When plastics were handled by excavators or loaders, gravel, soil, and non-plastic debris were more likely to be introduced into loads. Machinery operators were also less likely to remove contaminants manually due to time and safety constraints. These conditions were observed across multiple sites and construction phases.

Factor	Observations
Excavation, Early Works, and Wet Site Conditions	Excavation stages presented persistent challenges for maintaining clean plastic streams. Plastics generated during early works were frequently exposed to mud, dirt, and wet conditions, increasing contamination risk. These challenges were consistent across sites undertaking excavation during periods of wet weather. Ground contact plastics, particularly during early project phases, were more susceptible to contamination than plastics generated during later fit out stages.
Erosion & Sediment Control (ESC)	ESC plastics were a notable source of contamination across several sites. These materials were often heavily soiled. Their use as ground cover and frequent handling by machinery further contributed to contamination.
Material Size & Form	Physically small plastic pieces were commonly identified as unaccepted material due to the labour required for manual sorting. These included fragments from fixtures, finishes, and packaging. Although often technically recyclable, the small size and mixed nature of these items made separation impractical within site constraints, contributing to contamination totals.
Additional Handling and Pre Sorting	Sites that involved additional handling steps, such as moving plastics to interim storage locations prior to collection, provided more opportunities for contamination to be identified and removed. While this approach was associated with lower contamination in some cases, it required additional labour and handling, which may not be feasible across all project contexts.
Plastic Product Identification	Some confusion occurred around what materials were classified as plastic. Particularly around Rockwool insulation.
Leadership	Inconsistent management or change in leadership resulted in periods of higher contamination.
Construction Products and Practices Resulting in the Use of Adhesive and Fixings	Some construction practices and products lend themselves to using or including fixings and adhesives, e.g., duct tape use on PVC pipes and staples in lumber wrap. This did not have a significant impact on recorded contamination levels, but may cause some recyclability challenges depending on local processor's equipment and the type of tapes used.
Sorting rigor	A lack of attention to detail and level of inconvenience to separate material contributed to some contamination.
Subcontractor Bin use	Sites with many subcontractors and high turnover rates experienced higher levels of contamination.

Overall, contamination levels at many sites were on the lower end, demonstrating that a substantial proportion of construction-related plastics can be effectively captured and directed toward reuse and recycling pathways when thoughtful collection and sorting processes are in place, contradicting industry assumptions.

High-Quantity Contaminants

The most significant contaminants by volume and weight were mud and dirt, particularly on sites undergoing excavation or operating in wet conditions. This was closely associated with erosion and sediment control (ESC) plastics and excavation-stage materials, which were often handled by machinery rather than manually.

Cardboard was another high-quantity contaminant, often entering plastics bins alongside packaging materials. Wood contamination, primarily recorded at Site A, was associated with the proximity of plastics bins to wood-only bins and high levels of timber-related construction activity. Garbage and general waste were also present in significant quantities, particularly at Site A, where incorrect use of the plastics bin increased during later project stages. This increase coincided with staff and management changes, suggesting that contamination was influenced by a change in site management and crew turnover rather than misunderstandings about material separation protocols.

Figure 26: Plastic contaminated by mud and dirt

Rockwool insulation was recorded as a notable contaminant across several loads. It is unclear whether this resulted from confusion between rigid polystyrene insulation (accepted as a plastic) and other insulation products, or from disposal convenience during fast-paced construction activity. Broken and crumbled styrofoam also contributed substantially to contamination, particularly where fragmentation made containment difficult and separation impractical at the sorting stage.

High-Prevalence Contaminants

Several contaminants appeared frequently across loads, although present in relatively small quantities. Loose nails and staples were common, often embedded in or attached to large plastic sheets such as lumber wrap. Staple contamination was especially prevalent on projects with high volumes of lumber wrap, including sites B and C and was difficult to remove without significant manual effort.

Tape, primarily duct tape and tuck tape, was another pervasive contaminant. Tape was often used to secure packaging or seal pipe ends and was rarely removed prior to disposal due to the time required, resulting in otherwise recyclable plastics being downgraded or rejected.

Over the earlier construction stages during which plastic was collected for most projects, there was generally less paper/labels than expected during the finishing stages associated with interior fixture, appliances, and other individually packaged items. Site crews were also asked to remove any packing slips and other paper contaminants within reason. Ultimately, paper labels were not identified as an issue with regard to the plastics that were processed.

Mixed-material products, such as plastics combined with metal components, adhesives, or multiple resin types, were frequently recorded and posed challenges for recycling due to the inability to separate materials efficiently. Examples included plastic buckets with metal handles and Styrofoam bonded to cardboard substrates.

Small pieces of garbage and general waste were consistently observed across sites. Items such as coffee cups, food packaging, and non-plastic offcuts appeared to be placed in plastics bins out of convenience rather than misunderstanding of what constituted accepted materials, suggesting behavioural rather than informational drivers of contamination.

The following non-plastic materials were observed in plastic loads:

Overall, contamination levels amongst the participating construction projects averaged 21 per cent by weight, much of which could be mitigated with more refined collection protocols. This indicates potential for plastics

- Adhesives
- Brass fittings from pipes
- Cardboard
- Ceiling tiles
- Concrete bags
- Drywall
- Fabric
- Food
- Food packaging
- Garbage
- Gloves
- Gravel
- Hazardous material
- Hosing
- Insulation
- Leaves
- Metal
- Mud
- Paint
- Paper
- Screws
- Staples
- Styrofoam beads
- Tape
- Tar
- Waterproofing
- Wires
- Wood

generated from construction activities to be effectively captured for reuse or recycling when appropriate collection systems, bin placement, and handling practices are in place.

5.4 Processing

Although the primary focus of the study was data capture and upstream system design, targeted efforts were made to process construction-related plastics in order to test the feasibility of a full circular economy value chain—from on-site collection through to manufacturing. While the initial intention was to process as much of the recyclable plastic as possible, project time constraints limited processing to a representative sample of 1,634 kg of LDPE and PP plastic, which was mechanically processed into pellet form for manufacturing.

Figure 27: Processed CPI plastic

5.5 Manufacturing

A number of manufacturing applications were explored to assess the viability of integrating construction-derived plastics into end products. These trials were intended to test material compatibility, processing requirements, and constraints across different manufacturing pathways. CPI selected to work with an innovative new concrete void technology (InfinaNet) developed by InfinaTec (Figure 28). This patented technology displaces 30 per cent of concrete in residential concrete floor and wall slabs.[28]

Figure 28: InfinaNet™ concrete void technology

Recycled white construction film (LDPE) was successfully incorporated into the concrete void deck product at a conservative blending ratio of approximately five per cent to maintain material performance and processing stability. The relatively low blending ratio was a consequence of having insufficient information at the start of the project about the resins that would be generated from construction sites in order to select a compatible product for manufacturing. InfinaNet™ was selected as the trial product because of its application in construction and based on the presumption that CPI would recover significant amounts of HDPE, the resin used in manufacturing InfinaNet™. CPI did not end up yielding sufficient volumes of HDPE and it was decided to process LDPE instead, which could only be incorporated into InfinaNet™ in small amounts. Therefore, the low blend ratio reflected the resin types available during the pilot rather than the technical limits of recycled material incorporation into InfinaNet™. Plascon confirmed that the product can be manufactured entirely from 100 per cent HDPE from construction-derived plastics. The issue in this instance was a function of the small scale of the initiative, one that would not be a limiting factor if recyclable plastics were recovered and processed at scale.

28 https://www.infinatec.ca. The authors recognize that these types of products pose long-term challenges by creating mixed-material structures that may prove difficult to recycle. Weighing the merits of these solutions is beyond the scope of this study.

6. Economic Considerations

6. Economic Considerations

A persistent argument in the construction sector is that recycling plastic waste is not cost-effective when compared to disposal. This position often rests on a number of assumptions, including findings derived from residential recycling systems or small pilot initiatives rather than from a purpose-built construction value chain. The Construction Plastics Initiative (CPI) endeavoured to map and cost out the full value chain for construction-related plastics f rom onsite material separation to manufacturing, and by identifying where costs accrue and where value is created.

At its core, CPI was structured to demonstrate whether reclaiming, recycling and repurposing plastic from construction sites can operate as a financially self-sustaining system. The intended model mirrors conventional waste management flows. General contractors pay a hauler for bins, transport and tipping fees, as they would for mixed construction waste. The hauler pays to tip segregated plastic loads at a plastic processing facility. The processor prepares the material and sells extruded plastic feedstock to a manufacturer. The manufacturer incorporates that recycled resin into a finished product and sells it to the end user. In principle, each participant in this chain recovers its costs and earns a margin, and the system functions without ongoing subsidy.

In practice, it was difficult to draw definitive cost comparisons because disposal and recovery costs varied widely between projects and stakeholders. Tipping fees differed depending on contractor agreements, relationships with service providers, and waste volumes. Bin fees were sometimes bundled into overall waste contracts or waived entirely for large projects, making direct comparisons unreliable. Transport costs were similarly variable and highly dependent on hauling distances and routing efficiencies. The price differential between virgin and recycled plastic also fluctuated over the project period, further complicating economic assessment.

While a definitive economic analysis was not possible, the project did not subsidize the direct costs for any stakeholder and it was observed that costs incurred by stakeholders were within the range of what the market normally charges for each respective service. Exact costs depend on scale, infrastructure and regulatory context. In a mature system with stable volumes and proximate processing facilities, it is arguable that segregating plastics does not inherently impose disproportionate costs. Contractors already pay for waste services; the shift is from mixed disposal to targeted recovery. For haulers, dedicated plastic streams can be integrated into routing if volumes justify scheduled pickups and hauling distances are comparable to conventional transfer stations and landfills. Alternatively, new technologies could see plastics shredded and pelletized on site, reducing storage volume.[29] For processors and manufacturers, consistent supply reduces per-unit processing costs and supports investment in equipment.

However, CPI itself required subsidy. This requirement does not, in itself, invalidate the economic case; rather, it reflects structural inefficiencies associated with operating below scale and within an underdeveloped infrastructure environment.

First, volumes were insufficient to achieve economies of scale. Infrequent sorting schedules required on-call labour at higher unit cost. Hauling occurred on an as-needed basis, resulting in variable material flows and underutilized truck capacity. Longer hauling distances were required because only limited facilities were available to accept the material. Additional baling was required because sorting and processing functions were geographically separated, necessitating densification for transport. Bales were then transported between and within storage facilities, introducing additional handling costs.

29 For example, Samsara's Green Upcycling Process (GUP) pre-processing module pelletizes heterogenous plastic waste streams, including non-toxic contaminated plastic waste: https://samsaramaterials.com/technology.html.

Second, infrastructure constraints increased transaction costs. There was limited established collection and sorting infrastructure dedicated to plastics generated from construction activities. Existing recycling material recovery facilities (MRFs) are designed for containers and small materials, and not suited to easily accept construction-type plastics.

Third, construction-related plastics, particular packaging, often do not have resin identification markings and required manual assessment of specific products rather than reference to an established database or standardized labelling system. These information gaps increased labour time and slowed throughput. The project also selected end products requiring mechanical extrusion, which introduced processing costs that may differ under alternative, more economical end-use pathways.

Finally, the pilot context required ongoing assessment and coordination across partners, which would diminish in a mature system with standardized specifications, known material streams and contractual certainty.

When these incremental costs attributable to small scale and infrastructure limitations are stripped away, the underlying value chain suggests the characteristics of financial sustainability subject to defined enabling conditions. Study observations indicate that construction sites generate large, relatively homogeneous plastic components—often in clean, bulky formats. These attributes make them technically suitable for mechanical recycling, provided that collection and logistics are optimized. Where landfill tipping fees are variable or rising, or where landfill bans apply to recoverable materials, the economic case strengthens. Similarly, where manufacturers face minimum PCR-content requirements or corporate procurement standards favour recycled inputs, demand-side value increases.

However, this economic assessment must be understood in context. Tipping fees, landfill policies, hauling distances, the availability of local processing infrastructure, and the relative pricing of virgin and post-consumer resins all materially affect cost comparisons. In regions with high disposal costs or regulatory restrictions, recovery pathways become comparatively more attractive. In regions with appropriate sorting infrastructure, it may be feasible to assess whether large-format plastics generated from construction activities can be efficiently processed alongside other streams.

The central economic insight of CPI is that recycling plastics generated from construction activities is not inherently uneconomic; rather, it is currently disadvantaged by fragmented volumes, limited infrastructure, early-stage coordination costs and the cheap price for virgin resins. The pilot initiative required subsidy because it bore the fixed and transitional costs of system development. Once those transitional inefficiencies are addressed through scale, infrastructure investment, standardized material identification and predictable hauling schedules, the value chain has the potential to operate on a cost-recovery basis. For example, the system becomes more economical by focusing on simpler processing techniques and more compatible end products. In the case of CPI, it was decided early on to extrude the material. Similarly, the end product chosen to manufacture used an injection molding process. However, it is possible to simplify the recycling process by focusing on singular plastics[30] and selecting products that could be manufactured using a thermal process that combines the processing and manufacturing stages with higher tolerances for contamination and resin blends. On that basis, it is arguable that where scale and infrastructure are adequate, and processes are simplified, the aggregate system can balance, particularly where end markets value post-consumer recycled (PCR) resin.

30 See e.g., New Zealand's GoodWrap Recycling operates a product stewardship scheme for ProClima shrink wrap and backing film building membranes. The scheme is fully industry funded and has managed to recycle shrink wrap back into new 100% recycled shrink wrap. Economic conditions in the New Zealand market will be different, but the case study provides an example of a material-specific recycling and reuse program.

7. Observations

7. Observations

In addition to the empirical findings, the study made a number of important observations with regard to the collection, sorting, processing and remanufacturing of plastics generated from construction sites. Many of these issues and challenges need to be addressed through policy and industry innovation in order to facilitate more efficient and effective collection of plastics.

7.1 Collection

The following are issues identified during the study related to collection bin design and collection practices on construction sites that adversely affected the ability to collect plastics and separate materials on site.

(a) Bin Size and Capacity

Bin size was found to have a direct impact on labour requirements and overall efficiency of plastic collection. The 20-yard bin could accommodate plastic quantities being generated from most construction sites, however increased plastic generation on one site resulted in more frequent handling and reduced labour efficiency.

(b) Bin Coverage and Lids

At the outset of the initiative, bin lids were identified as a critical control measure to prevent water accumulation from rain or snow, reduce wind-blown litter, and limit the disposal of non-plastic materials into plastic bins. Two lid types were used throughout the project – a solid metal lid and a soft roll-up style lid. In practice, both lids proved challenging to implement effectively. They required additional effort from site staff and were not consistently used as intended. Despite the use of lids, water accumulation during collection and sorting was largely unavoidable, particularly given weather conditions and the extended time plastics remained exposed on site and at the sorting facility. These findings suggest that while lids can provide some benefits, current lid options make them an impractical standalone solution for contamination or moisture management.[31]

Figure 29: Water pooling on a lid of a plastics bin

31 The GoodWrap Recycling program in New Zealand often uses large plastic bags to store bulky plastic waste to protect it from water accumulation and contamination. These bags are manufactured out of recycled plastic so that the bags used for collection are from the same resin type as the recycled plastic allowing the collection bag to be recycled with its content instead of having to ship it back.

(c) Single-Bin Limitations and Sorting Constraints.

Existing waste hauling infrastructure did not allow for sorting of different plastics on site. As a result, labour was required downstream at the sorting facility to separate materials into recyclable and non-recyclable categories. Study findings indicate that on-site separation would improve the economics and effectiveness of post-consumer plastic recycling, particularly for high-value resin streams such as HDPE, LDPE, and PP. Potential approaches to enable this include modular internal dividers within roll-off bins, targeting key plastic streams to start, provision of multiple plastic bins where space allows, or the use of bulk bags to isolate specific plastic types during collection.

(d) Space Constraints and Site Layout

Space availability was frequently cited as a concern by projects during planning and site mobilization, however observations during implementation showed that most sites had sufficient space to accommodate an additional 20-yard bin, which typically requires an area of approximately 8 feet by 20 feet. In many cases, concerns around space were found to be perceived rather than actual. Three of the eight sites experienced genuine spatial constraints. These sites successfully mitigated limitations by adopting live-loading collection methods rather than placing permanent bins on site.

(e) Number and Distribution of Bins

The number and placement of bins across a site influenced worker participation and material capture rates. On larger or geographically dispersed sites, such as Site H, workers were sometimes required to travel long distances to access a plastics bin. This increased labour time may have undermined recycling practices and increased contamination levels. In contrast, on commercial fit out projects where sites were divided by levels, smaller collection containers were deployed on each floor. This technique arose after the single collection point proved to be too laboursome, limiting the amount of plastic being collected. Providing multiple plastic collection points on larger sites or sites with distinct work zones may improve accessibility, reduce handling time, and increase compliance with plastic diversion practices.

Figure 30: Plastics bin positioned on a construction site

(f) Live Loading versus Conventional Bin Collection

While live loading (conducted at three participating sites) reduced space requirements and offered a pre-screening of material for contamination, it introduced higher labour demands at the point of collection and required careful coordination to ensure materials remained clean and contained prior to hauling.

(g) Plastic Paint Containers

Every province in Canada has a program to recycle paint and paint containers. In British Columbia, this extended producer responsibility (EPR) program is operated by Product Care Association of Canada pursuant to the province's *Recycling Regulation*.[32] Under the EPR program for paint, an environmental handling fee (EHF) is charged at the time the paint is purchased by the end user and any residual paint and paint containers can be recycled at no additional cost. Importantly, EPR programs for plastic packaging has focused largely on residential packaging, while ICI packaging remains a live policy issue.

Figure 31: Product Care Recycling tote filled with paint buckets

For CPI, plastic paint containers were collected in separate totes provided by Product Care Recycling. In total, four participating sites generated 428 plastic paint containers that were collected and sent to Product Care Recycling. Product Care Recycling reports that 92 per cent of #2 plastic paint containers they collect are recycled and eight per cent are sent for energy recovery as an alternative energy source in licensed incinerators, while 100 per cent of #5 plastic paint containers collected are sent for energy recovery.[33] The percentage of paint containers recovered is not reported.

While sites accommodated the separate totes, none of the general contractors had utilized this free program in the past to manage paint containers, relying on their painter sub-contractors to manage their own waste. The study could not confirm if the sub-contractors did or did not utilize the program. In one instance, containers were found in the plastic bin cut in half. It was explained that it is common practice amongst painters to cut pails because they are then deemed waste and can be sent to landfill, circumventing Metro Vancouver's ban on materials covered under EPR programs, rather than the painter having to take them off-site and manage them responsibly.

7.2 Hauling

Hauling distances are a significant factor influencing the diversion and recycling of materials. With limited plastics recycling infrastructure in the Lower Mainland, hauling distances between participating construction sites and sorting facilities was not optimal and haulers had to take materials longer distances that they might otherwise be willing to travel in a non-test environment.

32 BC Recycling Regulation, Reg.449/2004 as amended.

33 Product Care Association of Canada. (2024). British Columbia Paint and Household Hazardous Waste Program 2024 Annual Report. Appendix 1.

The challenges facilitating the efficient movement of plastics along the value chain in this small-scale initiative highlighted the need for more local receiving facilities, on-site or near-site sorting, and decentralised processing solutions that reduce reliance on long-distance transport in order to support commercial plastics recycling at scale.

Operationally, hauling infrastructure presented several limitations. Trucks used during the program were generally basic and lacked internal division systems, restricting the ability to transport multiple separated plastic streams from site. This constrained opportunities for on-site sorting and necessitated downstream separation at the sorting facility. However, some trucks were equipped with on-truck scale systems, presenting an opportunity for future source separation programs. Improving alignment between collection volumes and haul scheduling may also improve efficiency, particularly for smaller sites.

7.3 Sorting

Sorting was a critical but resource-intensive component of CPI, with performance influenced by labour requirements, facility capacity, and challenges in accurately identifying plastic resin types. Based on data from 67 loads, sorting required a total of 36 seconds per kilogram of plastic, equating to a cost of approximately $0.34 per kilogram. These figures indicate that sorting was a relatively inefficient and high-cost stage of the value chain.

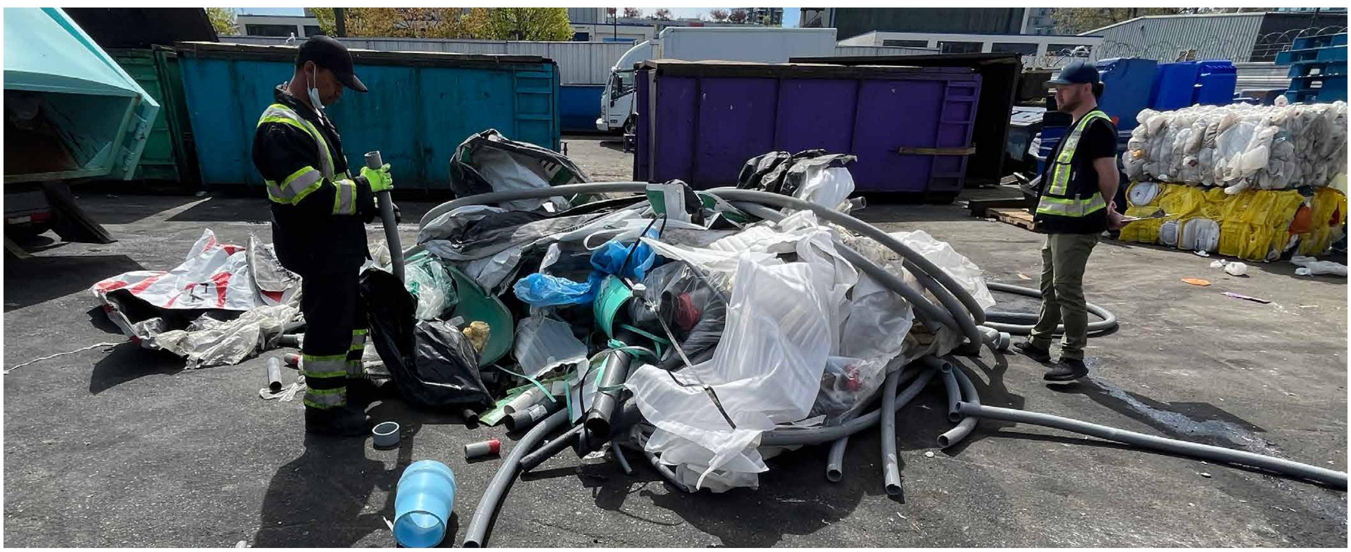


Figure 32: Sorting crew sorting a plastic load

Part of this inefficiency reflects the scope of activities undertaken during sorting to support the study. In addition to physical separation of materials, the process incorporated weighing, recording, and tracking of plastics for reporting purposes, which increased handling time per kilogram and would not necessarily be required under normal operating conditions. While these steps were necessary for data collection relating to the study, they contributed to higher labour inputs and costs compared to sorting operations focused solely on material separation.

(a) Labour Intensity and Handling Constraints

Sorting frequently required multiple workers, particularly when handling large or unwieldy materials. The scale and form of construction-related plastics directly influenced labour needs; for example, large plastic sheeting often required up to six people to manage safely and effectively. This limited the ability to streamline operations and increased reliance on coordinated manual handling. Some large materials like PVC pipes posed a hazard due to their size and difficult nature to handle.

In the absence of plastic resin identification equipment, the limited availability of trained labour capable of identifying plastic resin types was a constraint on the project. The variety of resin types and lack of resin uniformity across products required a high degree of inspection. Each new individual required training in resin identification, adding time and cost to onboarding and reducing overall productivity. Without experienced personnel or plastic resin identification equipment, sorting accuracy and speed were difficult to maintain, particularly when dealing with visually similar plastics.

(b) Sorting Infrastructure & Capacity

The initiative also revealed structural limitations within the local sorting market. Only two facilities in the Metro Vancouver region were identified as having the willingness and capability to engage in sorting construction plastics.[34] Some facilities declined to participate because of workforce constraints, limited capacity to manage high volumes, and the high cost of plastic storage. Facilities faced varying operational challenges, including restricted periods when they could accept materials because of competing client commitments, insufficient space to accommodate large construction plastic loads alongside other materials and in one facility's case, a lack of existing expertise in construction plastic resin identification that required additional training.

7.4 Storage

Storage emerged as a necessary interim component of the CPI value chain due to the lack of fully streamlined downstream partnerships. Throughout the project, delays and inconsistencies in processing capacity, material quality requirements, and end-market purchasing arrangements required plastics to be stored for extended periods. These challenges reflected the early-stage nature of recycling systems designed for construction-related plastics, where supply chains are still being established and aligned.

Figure 33: Sorted and baled construction plastic

34 Near the end of the project, processors were identified that could potentially manage a broader range of construction-related plastics. Light House intends to engage these companies in future initiatives.

In a mature circular economy context, where high volumes of plastic are generated consistently, and processing and end-markets are well coordinated, the role of storing materials would focus on ensuring sufficient feedstock for uninterrupted processing. However, during the development phase of a circular system, short- to medium-term storage is a critical consideration to enable continuity of collection and sorting activities while downstream issues are resolved.

The majority of stored plastics were kept outdoors on unpaved surfaces, which introduced several quality and contamination challenges. Exposure to surrounding site conditions resulted in observed contamination from gravel, mud, and other organic materials, particularly where plastics were placed directly on the ground or where handling occurred during wet conditions.

Extended outdoor storage also led to photodegradation, which may have reduced material quality and downstream recyclability. In addition, water accumulation within hollow or folded plastic items created handling difficulties, increased load weights, and further elevated contamination risk.

7.5 Processing

The study revealed critical insights into the technical, operational, and economic constraints associated with processing construction-derived plastics.

(a) Equipment Risk and Contamination Sensitivity

Figure 34: Shredded construction plastic

Shredding and extrusion equipment is highly sensitive to contamination and how materials behave when processed. Processors expressed concern about the risk of loose plastic catching in shredding machinery, although new technologies address these concerns. Large flexible items, such as sheeting and wrap, behaved differently from more rigid or dense post-consumer plastics requiring innovative approaches to process them.

Metal contamination was repeatedly identified as a critical risk. Even small, individual pieces of metal are capable of causing significant damage to machinery. During one test batch, staples and other metal fragments triggered the shredder's magnetic detector repeatedly, significantly slowing processing and increasing labour requirements. These findings reinforce the importance of working with suppliers to reduce the amount of contaminants and general upstream contamination control, particularly for plastics commonly associated with fasteners, such as lumber wrap.

(b) Material-Specific Processing Challenges

Lumber wrap presented a particularly complex processing challenge. Despite being previously sorted and baled, each piece of material required manual shaking and inspection to remove residual metal, gravel, or glass. The shredder's metal detector stopped the machine frequently, resulting in substantially higher labour inputs than anticipated.

Further inspection of lumber wrap bales revealed that they often contained multiple product variants, including wraps with a thin internal paper layer bonded to woven polypropylene. These composite materials cannot be separated manually and would require mechanical or chemical separation prior to pelletization. This added complexity reduced material value and introduced additional processing steps that were not initially anticipated.

Similar challenges were observed with LDPE film bales, which contained multiple film types—such as heavy-gauge shrink wrap and lightweight flexible packaging—each requiring different processing conditions. This heterogeneity increased processing complexity and reduced operational efficiency.[35]

(c) Material Variability and Testing Requirements

Across manufacturing discussions, there was a clear preference for consistent and predictable feedstock. Manufacturers and processors alike indicated that variability in recycled plastic increases production risk, reduces efficiency, and constrains product design options. Consistency was identified as a key enabler for repeatable production and broader market adoption of recycled plastics derived from construction.

Material variability is a critical challenge when dealing with recycled materials. Recycled plastics can exhibit a high degree of inconsistency between batches due to mixed resin types, variable contamination levels, and differing processing histories. To obtain the highest degree of consistency and limit costly material testing, the project focused on processing key materials that were generated in large volumes (i.e. lumber wrap and white construction film).

Multiple manufacturers noted that recycled plastics are often incorporated at relatively low percentages to manage variability, processing risk, and performance uncertainty. Under a successful circular economy model, this constraint must be addressed either through improved upstream sorting to deliver more consistent, low-contamination feedstock, or through processing and product development pathways that are explicitly designed to tolerate higher variation and contamination in recycled plastics.

(d) Implications for End-Use Applications

Construction-related plastics were found to be more difficult to process to the quality standards required for injection molding than for lower-tolerance processing options, such as thermal or compression-based processing and manufacturing. Injection molding processes have minimal tolerance for contamination due to fine nozzle sizes, while extrusion processes were susceptible to clogging and flow interruptions caused by impurities.

35 New technologies, such as Samsara Material's Green Upcycling Process (GUP) hold promise for overcoming sorting and processing challenges. GUP can shred and pelletize flexible and rigid plastics on-site, addressing storage capacity issues. Its manufacturing process can also tolerate mixed plastic waste streams requiring less sorting and training.

Figure 35: Construction plastic during extrusion

Variation in resin types within single bales further complicated extrusion, requiring continuous temperature adjustments and increasing downtime. These findings suggest that construction-related plastics are better suited to manufacturing pathways that rely on heat and compression rather than precision extrusion or injection molding, unless significant upstream sorting improvements are implemented.

(e) Labour and Cost Implications of Test Processing

Test bales were sent to Ocean Legacy, where they incurred unusually high labour costs to process due to the need to open each bale and manually inspect plastics for metal contamination. While this level of scrutiny would not occur in typical commercial operations, it highlights the precautions required to address the risk of contamination associated with construction-related plastics.

(f) Processing System Limitations and Infrastructure Gaps

During pelletization trials with lumber wrap and poly sheeting, Ocean Legacy identified an unexpected issue: small, low-density plastic fragments were drawn into the facility's air filtration system during the crumbling stage. Accumulated material ultimately blocked the water recirculation system, causing significant downtime while the issue was diagnosed and resolved. This behaviour had not been observed with higher-density ocean plastics, indicating that construction-related plastics introduce distinct operational risks. A pre-filtration system would be required to safely conduct future processing runs.

(g) Washing Constraints

Plastic washing was identified as a potential contamination mitigation strategy; however, none of the processors engaged had washing equipment suitable for construction-related plastics. Washing baled material was noted as particularly difficult, and large-format plastics (such as sheeting and wrap) posed additional handling challenges. While washing could improve material quality, it would introduce further labour, water and energy use, and cost considerations, limiting its feasibility within the current system.

The processing trials demonstrated that while construction-related plastics can be technically recycled, their variability, contamination risk, and material complexity introduce operational and economic challenges. These findings reinforce the importance of upstream sorting, contamination control, and material specification if construction-related plastics are to be successfully integrated into higher-value recycling and manufacturing pathways. It also suggests that thermal or compression manufacturing may be more suitable to construction plastics than injection molding.

7.6 Leadership and Training

Leadership engagement and workforce training emerged as key enabling factors influencing participation, material quality, and contamination outcomes across participating sites. Projects with visible and sustained leadership support demonstrated higher levels of worker engagement and, in several cases, lower contamination rates, reinforcing the importance of organisational commitment in implementing on-site plastic collection initiatives.

(a) Leadership Influence on Site Performance

Sites with invested leadership consistently showed stronger program uptake and clearer adherence to accepted material guidelines. Investment in the initiative was evident where project managers or site leads had a personal interest in sustainability, where sustainability teams were directly involved as site contacts, or where corporate sustainability objectives aligned with project delivery. At Site B, for example, external media coverage helped reinforce the value of participation and contributed to a sense of pride and accountability among site staff.

Where project management roles of site superintendents included sustainability objectives, decision-making related to bin placement, resourcing, and site communication was more effective. In these contexts, leaders were better positioned to reinforce expectations with site crews, address contamination issues as they arose, and support behavioural consistency over the life of the project. Conversely, sites with less visible leadership engagement, or leadership turnover, relied more heavily on individual worker initiative, which increased variability in outcomes.

(b) Training Protocols & Frequency

Over the course of the initiative, a substantial number of workers were trained. At Site E, for example, over 520 workers participated in training sessions. Across sites, workers demonstrated a clear understanding of the core principles of the program, including the identification of accepted and unaccepted materials, and generally applied this knowledge in practice. These observations indicate that upskilling large and diverse construction workforces in plastics recycling practices is both achievable and scalable, supporting the feasibility of broader industry adoption.

Figure 36: CPI's site monitor briefing a construction crew on plastic separation

Smaller sites typically required only a single initial training session, which was generally sufficient to maintain compliance. Larger sites with high workforce turnover required repeated training sessions as new staff and subcontractors joined the project. With larger sites that had a higher turnover of subcontractors / people on site, it was most efficient to conduct one orientation and training session with the general contractor's site-level management team. It was then the responsibility of the Chief Sustainability Officer (CSO) or safety coordinator to include information about the initiative in every site orientation.

Approaches to training delivery varied across projects: some sites preferred Light House to deliver site-wide training directly, while others opted for a "train-the-trainer" model, where the site superintendent received training and disseminated information to site teams.

(c) Time constraints

Despite strong baseline understanding, there were clear limitations to the level of sorting that could reasonably be expected from site workers. Time constraints were a recurring barrier, particularly for tasks such as removing tape from pipes, separating mixed materials, or walking additional distances to access plastics bins. These constraints were most evident during high-pressure construction phases where productivity took precedence.

(d) Material identification and sorting

While workers were generally able to identify plastic materials and distinguish accepted from unaccepted items, further on-site separation by resin type would have required additional training, clear visual aids, or scanning tools. Without these supports, accurately identifying resin types onsite (particularly where products were visually similar) is not considered feasible under typical site conditions.

The findings indicate that sustained leadership engagement and practical, well-timed training are critical to the effective implementation of on-site plastic collection initiatives. Projects with visible leadership support and clear lines of responsibility demonstrated more consistent participation and material quality, while training approaches proved effective in building baseline understanding across diverse workforces. However, the results also highlight the importance of aligning expectations with construction site realities. While workers were generally able to identify and separate accepted plastics, constraints related to time, workflow, and material complexity need to be managed for feasible site sorting.

7.7 Industry Perceptions

The perceptions of general contractors and other industry stakeholders influenced both participation decisions and expectations around the outcomes of CPI. Several sites expressed early interest in the program, but ultimately did not participate due to perceived space constraints or concerns about additional costs for separate plastic bins and associated hauling charges.

Some participating sites also expressed skepticism regarding whether construction-related plastics are ultimately recycled. This perception was often informed by broader public narratives, including reference to a 2019 CBC investigation that used tracking devices to highlight shortcomings in plastic recycling systems.[36] A lack of familiarity with different plastic resin types and their varying recyclability further contributed to uncertainty about program effectiveness. In parallel, some partners believed that plastic volumes generated on construction sites were insufficient to justify separation efforts.

36 CBC GEM. (2018, March 29). *Marketplace. Season 47, Episode 1*.

However, for those that participated, perceptions shifted by the conclusion of the initiative. Multiple participating contractors expressed disappointment at the program's end and actively sought alternative pathways to continue plastic recycling. This suggests that perception change is possible within the construction industry and the perceived value of waste diversion has the potential to be increased through participation.

8. Recommendations to Support Sector Transformation

8. Recommendations to Support Sector Transformation

The transition to a circular system for construction-related plastics does not follow a simple linear sequence. In complex systems change, it is difficult – and often counterproductive – to rigidly prioritize one intervention over another. Multiple enabling conditions must evolve simultaneously, each reinforcing the others. The critical path, therefore, is not a single track but a coordinated set of advancing fronts that must remain aligned.

At the centre of this transition is processing infrastructure. Expanded investment in regional facilities capable of receiving and processing construction-derived plastics is a primary constraint. Infrastructure must be designed to accommodate high-volume films and packaging materials and to tolerate modest levels of contamination, recognizing the operational realities of construction sites. Without sufficient receiving capacity and contamination-tolerant processing systems – whether mechanical, thermal, or chemical – material flows will continue to default to landfill regardless of upstream effort. Targeted public incentives, risk-sharing mechanisms, and private capital deployment are therefore foundational and must begin early in the transition.

Parallel to infrastructure expansion is the implementation of best practices to minimize contamination at source. Site-level operational normalization, including clear bin placement, leadership accountability, phase-specific bin management, workforce training, and avoidance of mechanical loading of plastics directly improves feedstock quality. Reduced contamination lowers processing risk, decreases labour intensity, and expands the range of viable end uses.

A third enabling condition is the development of robust and durable end markets. Policy instruments requiring minimum post-consumer recycled (PCR) content in new products play a critical role here. Recycled-content mandates, public procurement standards, and corporate purchasing commitments provide predictable demand signals that justify infrastructure investment and stabilize pricing.

Finally, product innovation expands the system's absorptive capacity. Innovation in manufacturing pathways, particularly applications capable of utilizing construction-derived plastic generated through thermal or chemical processing reduces reliance on high-purity mechanical streams and increases tolerance for moderately contaminated plastics. Products designed for compression molding, thermal processes, or chemically recycled feedstock create additional outlets for material that might otherwise be downgraded or rejected because those processes have a higher tolerance for contamination and are therefore less reliant on perfect source-separation practices.

Taken together, the critical path is defined by four reinforcing pillars that must advance in coordination:

- Investment in contamination-tolerant processing infrastructure.
- Implementation of best practices to minimize contamination at source.
- Establishment of strong, policy-supported end markets requiring minimum PCR content.
- Ongoing product innovation that broadens the range of viable recycled feedstocks.

No single pillar can succeed independently. Infrastructure without end markets lacks economic stability. End markets without infrastructure lack supply. Source separation without tolerant processing remains fragile. Innovation without volume and demand remains niche. When these conditions mature together, the circular management of construction-related plastics becomes structurally durable and feasible at scale.

> We can divert construction plastics, but there needs investment in infrastructure for these specialized, sector specific waste streams, in order to create systems to effectively capture and recover these materials."
>
> — Louise Schwarz, Recycling Alternative

The findings from this report demonstrate that diverting and recycling a portion of construction-related plastics is technically feasible in Metro Vancouver, with emerging technologies and infrastructure showing the potential to overcome many of the remaining technical limitations affecting sortability, processing and manufacturing to allow for the repurposing of most construction-derived plastics. The remaining challenge is structural. The 29 recommendations that follow outline a pathway to move the management of construction-derived plastics from the current linear system toward a circular economic model in which plastics are minimized, and those that are generated through construction activities are transformed from a waste product into a valued resource. Recommendations address both immediate, practical considerations, such as bin configuration and site practices, and the broader systems changes required to embed circularity across the value chain.

The recommendations set out below cannot be successful in isolation. Systems change from a linear to a circular economic model will not occur through a single policy intervention or isolated industry initiative. Rather, experience in the evolution of other systems transformation, such as electronics extended producer recycling programs, organics diversion and industrial decarbonization schemes, all illustrate the need for enabling conditions to evolve in parallel. Collection practices cannot succeed without compatible hauling and processing infrastructure; processors cannot invest without predictable volumes and end markets; manufacturers cannot incorporate recycled feedstock without upstream material consistency. Progress therefore depends on coordinated action by manufacturers, contractors, haulers, processors, and government. Accordingly, this section concludes by positing a critical path for implementing recommendations through multiple pathways executed in parallel to support each other.

Finally, while concerns persist that separating plastics increases project costs, this study's findings indicate that most recommended actions do not require fundamentally new expenditures, but rather a shift in decision-making priorities so that plastic diversion is integrated into project planning, procurement, and site management from the outset. Together, these recommendations outline a practical and scalable transition from disposal to circular resource management for plastics generated from construction activities.

8.1 Manufacturers

Manufacturers are key stakeholders involved both with generating plastic products and packaging entering the market (supply) and procuring products and packaging made from post-consumer feedstock (demand).

8.1.1 Following the pollution prevention hierarchy and the Golden Design Rules for Plastic Packaging developed by the Consumer Goods Forum (specifically rules 7-9), work with manufacturers to identify ways to

- Reduce packaging entirely wherever possible.
- Reduce use of virgin plastics in construction-related products and packaging.

- Develop reusable packaging or packaging that is made from easily recyclable materials with no contaminants, e.g.,
  - Reduce multilayer bonding packaging
  - Eliminate staple heavy wrap systems
  - Develop reusable packaging for mass timber, lumber and modular construction (e.g., clearly label resin type on all products)
- Provide on-material recycling instructions and standardize disclosure of material specifications to improve consistency and make it easier to manage materials downstream.

8.1.2 Implement company-specific or industry-wide product stewardship (take-back) schemes for packaging, similar to the GoodWrap Recycling and Pro Clima example for LDPE packaging and Marley's scheme for HDPE and PVC pipe offcuts[37], both in New Zealand.

8.1.3 Support development of products that can tolerate greater variability in recycled content and contamination levels.

8.1.4 Develop procurement consortiums offering set pricing for post-consumer recycled plastic resins that provides market certainty for processors, enabling them to commit to process recycled feedstock at scale.

> "The business opportunity is significant. Construction plastics represent a largely untapped feedstock for manufacturing applications, offering cost stability, local supply, and reduced environmental impact compared to virgin materials. Recycling plastics not only diverts waste from landfills but also lowers embodied carbon and supports domestic manufacturing."
>
> — Manveer Pattar,
> President, Infina Technologies

8.2 Construction Companies

Construction companies play a key role in the value chain as both purchasers of products (demand) and controlling the management of waste on construction sites (supply).

8.2.1 Incorporate plastic separation into solid waste management plans for all projects.

8.2.2 Contract waste haulers that have verifiable sorting practices and reporting capabilities.

8.2.3 Improve site design and bin strategies

- Separate primary resin types (PP, PE, PVC).
- Work with Product Care Recycling to provide dedicated totes for plastic paint containers, and require all paint sub-contractors to use the totes or verify that they manage used containers through Product Care Recycling.
- Use bin dividers or megabags (aka supersacs or helicopter bags) where space constraints exist.
- Install multiple collection points on larger or geographically separated sites to reduce walking distances for crews.

37 See https://marley.co.nz/sustainability/recycling/.

- Avoid placing bins directly beside other material collection bins to avoid contamination.

8.2.4 Implement practices to reduce contamination

- Avoid mechanical loading of plastics.
- Train crews to deposit packaging into collection bins immediately to avoid contamination.
- Keep heavily contaminated plastics (e.g. dirty plastics associated with excavation activities) separate from clean plastics.

8.2.5 Support on-site leadership in collection and sorting best practices

- Embed plastic diversion targets into site performance requirements and protocols.
- Educate site supervisors about different plastic materials and resin types entering construction sites.
- Integrate plastics training into site orientation for all workers and subcontractors.[38]
- Integrate learnings and specific interventions from CPI into training materials to address common causes of contamination.

> CPI represents an important step toward closing the loop on construction-related plastics by transforming waste into valuable building materials. Initiatives like this demonstrate the power of collaboration across industry partners to reduce environmental impact, drive innovation, and support a more resilient future for construction in Canada."
>
> — Sari El Srouji,
> Project Manager, Pomerleau

8.2.6 Enhance procurement policies and practices by specifying requirements for suppliers that have packaging take-back programs and that use alternative or mono-plastic packaging. Extend this requirement to owners and developers to include in their tenders for general contractors.

8.2.7 Mandate that paint sub-contractors recycle plastic paint containers through Product Care Recycling and/or locate a collection tote on site through the Large Volume collection program offered by Product Care Recycling.

8.3 Waste Management Services and Haulers

Waste management companies and haulers are critical enablers to help construction projects achieve plastic diversion objectives.

8.3.1 Provide bins with divided compartments for resin separation on site.

8.3.2 Provide live loading options for constrained urban sites.

8.3.3 Explore on-truck scale systems to improve data capture and ease in transporting material to alternative end destinations.

38 New Zealand construction company Naylor Love has developed a Resource Sorter micro-credential to provide specialists on each construction site that can guide the rest of the team.

8.3.4 Consider introducing compacting technology for more cost-effective and efficient transport of high-volume plastics (pre or post sorting).

8.3.5 Invest in trucks with divided compartments to transport separated plastic streams.

8.3.6 Focus on specific, consistent materials to provide a stable base of operations before expanding into additional streams.

8.4 Processors

Plastic processors are the essential step in the value chain that facilitates conversion of waste to a resource.

8.4.1 Introduce or adapt equipment that can accommodate construction-related plastics, including:

- Prefiltration systems for low density film fragments.
- Detection technologies to reduce risks from contaminants.
- Processing capacity for frequent high-volume materials i.e., LDPE and PP wrap.
- Processing options (e.g. thermal, chemical) with high tolerance for mixed resins and contaminants.

8.5 Government

All levels of government play an essential role in both policy development and implementation, and as a developer, advancing research, facilitating industry engagement investing in infrastructure development, and supporting market development.

8.5.1 Conduct an expanded longitudinal study that captures the full duration of construction projects across different building typologies in different regions of Canada and pilots new sorting and processing technologies to provide more robust data to support market development. [Federal]

8.5.2 Under the Federal Plastics Registry, develop and implement standardized reporting requirements for plastic products and packaging entering and leaving construction sites. [Federal]

8.5.3 As part of the Federal Plastics Registry, develop an open database of resin types/ technical information for all plastic products/materials entering construction sites in Canada to enable faster and more accurate material identification and sorting by downstream parties. [Federal]

8.5.4 Facilitate discussion amongst industry stakeholders to expand regional capacity to process the full range of plastics generated from construction, renovation and demolition. [Regional/Municipal]

> “Scaling these circularity projects require supportive policy, standards, and procurement incentives that prioritize recycled content and enable end-use markets. Initiatives like Light House’s CPI Project demonstrate that with the right collaboration, plastics generated from construction activities can move from waste to essential infrastructure materials.”
>
> — Prabhjit K. Banga,
> Aecon Group Inc.

8.5.5 Create best practice guides for the construction sector on plastics management. [Provincial/Regional/Municipal]

8.5.6 Introduce programs, challenges and financial incentives to stimulate development and implementation of plastic-reduction strategies, product innovation, processing technologies and infrastructure that can manage construction-derived plastics (see Processor recommendations).

8.5.7 Expand extended producer responsibility programs for plastics and packaging to include plastics associated with construction, renovation and demolition and other ICI-derived plastics. [Provincial]

8.5.8 Implement other policies and incentives that address conventional waste management practices, e.g.:

- Variable tipping fees for sorted plastics at public material management facilities. [Regional/Municipal]
- Landfill bans on recyclable plastics from construction sites. [Regional/Municipal]
- Tax credits and other financial incentives for manufacturers incorporating construction-derived plastics into their products. [Federal]
- A plastics certification scheme for builders that recognizes those who demonstrate best practices in plastics diversion. [Federal]

8.5.9 Establish or support the development of localized hubs (transfer stations) designed to receive and consolidate construction-related plastics to reduce hauling distances.

9. Conclusion

9. Conclusion

The Construction Plastics Initiative provides the first detailed examination in Canada of how plastics move through construction sites, how they are managed, and where systemic barriers prevent diversion at scale. The findings of this report confirm several important realities. Construction sites generate consistent and significant volumes of plastic. Much of this material is technically recoverable. When basic separation practices are implemented and contamination is actively managed, plastics can be aggregated and processed into viable feedstock. However, the system surrounding plastics generated from construction activities remains fragmented, under-capitalized, and structurally oriented toward disposal.

The initiative demonstrates that the primary barriers are not a lack of technical feasibility, but a lack of aligned infrastructure, stable end markets, and coordinated policy signals. Processing capacity capable of receiving construction-derived plastics is limited. Existing facilities often require higher material purity than construction conditions can consistently provide. End markets for post-consumer recycled resin fluctuate without strong policy-backed demand. Packaging design and material complexity further complicate recovery. These challenges reinforce one another within a linear economic model that treats plastics as a cost to be minimized rather than a resource to be retained.

Encouraging progress is underway. Federal initiatives such as the Federal Plastics Registry represent an important step toward improved data transparency and accountability. Broader national efforts to strengthen recycled-content standards and advance extended producer responsibility frameworks signal recognition that plastics must remain in circulation. Industry actors are also beginning to test improved site practices, packaging simplification, and procurement alignment.

Yet the report's findings make clear that incremental change will not be sufficient. If construction-related plastics remain outside of circular systems, Canada's broader efforts to address plastic waste will be incomplete. Construction is a major end-use sector for plastics. Excluding it from circular design, recovery infrastructure, and recycled-content integration leaves a substantial material stream unmanaged.

A circular economic approach offers a practical path forward. Enhanced investment in processing infrastructure, particularly systems capable of tolerating modest contamination, must occur alongside the normalization of site best practices that reduce contamination at source. Robust end markets supported by minimum post-consumer recycled content requirements can provide the demand certainty needed to justify capital investment. Product innovation, including applications that can utilize feedstock derived from mechanical, thermal, or chemical processing, can expand the system's absorptive capacity and reduce dependence on high-purity streams.

The Construction Plastics Initiative does not present circularity as simple or immediate. It acknowledges logistical complexity, capital requirements, and coordination challenges across the value chain. However, if Canada is to meaningfully address the environmental, economic, and climate impacts associated with plastic production and disposal, construction-related plastics must form part of the solution. The data and pilot results presented in this report demonstrate that diversion is achievable and that system redesign is economically and operationally plausible. The next step is collective action to align infrastructure, markets, product design, and policy so that construction-related plastics transform from being a liability to a resource within a circular economy.

Appendices

Appendix A: Specific site conditions for participating construction sites

The following are site-specific factors that influenced plastic collection at each of the eight participating sites.

Site A:

- Large scale outdoor venue with a total site area of approximately 126,751 sq ft, including amphitheatre infrastructure and built landscape elements that are not directly comparable to typical enclosed building projects.
- Extensive use of mass timber, which arrived wrapped in multiple layers of protective plastic for transport and storage.
- Plastic generation was concentrated during mass timber installation, with substantially lower generation outside this phase. Bin services in the later stages of the project were infrequent and featured a greater variety of plastic items opposed to the large quantities of plastic wrap generated in early stages.
- Plastic collection occurred over the longest duration of all sites (12 months).
- Three loads were sent directly to landfill due to program receiving constraints (Unidentified Material).
- Two loads were sent directly to landfill due to high contamination (Unidentified Material).
- Large workforce size required ongoing training and coordination related to sorting practices.
- Multiple leadership changes occurred over the project duration. The sorting standard was consistently high for majority of the project under two site leaders however a final change of leadership in the remaining months led to reduced perceived sorting diligence.

Site B:

- New build municipal facility using steel framing and cross laminated timber (CLT).
- Two loads were sent directly to landfill due to contamination.
- Strong superintendent leadership and on-site media coverage helped build team pride and high workforce engagement.

Site C:

- Plastic collection commenced early in the project during framing and structural phases.
- Construction involved mass timber and steel framing systems, resulting in substantial quantities of protective plastic wrap.
- Project leadership demonstrated a high level of engagement with plastic collection processes.

Site D:

- Prefabricated modular building addition to an existing elementary school.
- Short duration project with plastic collection occurring for approximately three months.
- Limited plastic waste was generated due to the modular construction methodology.
- Large amount of polyisocyanurate insulation was not collected due to recycling challenges (including fibreglass-paper layer) and was excluded from this study.

Site E:

- Tenant improvement project, resulting in a higher proportion of small format plastic waste from fixtures and fittings rather than large volume protective plastics.
- Early project engagement occurred; however, there was a significant delay between site mobilisation and the first plastic collection. As a result, the total quantity of plastic generated during early stages is unknown.
- Collection logistics were complex due to space constraints, requiring plastics to be stockpiled and live-loaded from a parkade. Contractual arrangements required the general contractor (as opposed to a waste management provider) to supply labour for this process.
- A high volume of clean PET soundboard was generated; however, no local recycling processors were able to accept this material at the time of the project. This material was categorized as PET for sorting purposes, and ultimately landfilled.

Site F:

- Tenant improvement project with similar waste characteristics to Site E, including high volumes of small format plastic from fixtures and finishes.
- Delivered by the same general contractor as Site B.
- Waste management contractor provided on site labour for sorting, live loading, and transport, including pre-screening of materials prior to hauling. This arrangement introduced an additional sorting step that may have influenced contamination and non-recyclable/ recyclable levels recorded in collected loads.

Site G:

- Small scale tenant improvement project.
- Predominantly generated small plastic pieces associated with fixtures and finishes.
- A high level of effort was invested in sorting small plastics from site as there was only one load for the full project lifespan. Plastic of this size on other sites was considered ‘unaccepted material’.
- Only one load of plastic was collected over the life of the project.
- Featured a well-designed plastic collection station with clear signage and high visibility, supported by engaged project leadership.

Site H:

- Linear infrastructure project spanning approximately 500 metres and two sides of an active railway corridor.
- Only one plastic collection bin was installed, located at one end of the site, due to cost considerations.
- Plastic collection occurred during early construction phases (excavation, piling, and foundation works), which generated limited recyclable plastic.
- Significant plastic waste was anticipated in later phases (e.g. hoarding and HDPE pipe installation) but was outside the collection window.
- Many ground cover and erosion and sediment control plastics were too contaminated for recycling.
- Cost mitigation reduced plastic collection. The contractor was paying for recycled plastic, and the client was paying for general waste, therefore any plastics that were unlikely to be recycled (from contamination or knowledge of local markets) was placed in the landfill bin by site staff instead of plastic collection bin.

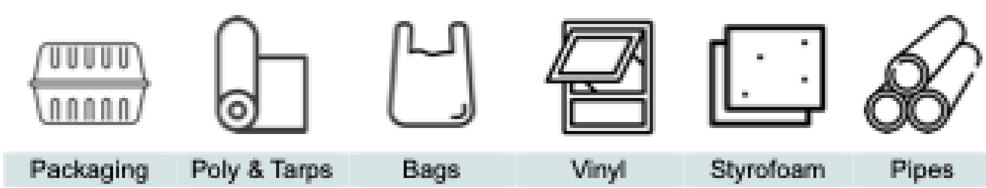
Appendix B: Program overview for construction sites

Construction Plastics Initiative

What is it? This site is participating in the Construction Plastics Initiative – a plastic waste diversion pilot project being conducted by Light House. The objective is to collect, separate, measure, and process all plastic waste from participating construction sites, and to demonstrate innovative ways to divert and repurpose the plastic into new products. The project is funded through the CleanBC Plastics Action Fund and Environment and Climate Change Canada and will be in operation until February 2026.

The collected plastic will be taken to a facility in Vancouver where it will be sorted and recycled into pellets. Once processed, the pellets will be used as feedstock for new building products, with the goal of reintroducing those products back into the construction market.

We Need Your Help!
Collecting ALL TYPES of plastics for recycling, including:



Accepted:

- ✓ All Plastic Types (1-7)
- ✓ Clean, Uncontaminated Plastics
- ✓ Hard & Soft Packaging
- ✓ Poly, Bubble Wrap, Shrink Wrap
- ✓ Plastic Bags, Tarps, Film
- ✓ Styrofoam, Rigid Insulation
- ✓ PVC, ABS, PEX Pipes
- ✓ Vinyl Siding & Flooring
- ✓ Plastic Tools, Buckets (Clean)
- ✓ Bottles, Containers

Not Accepted:

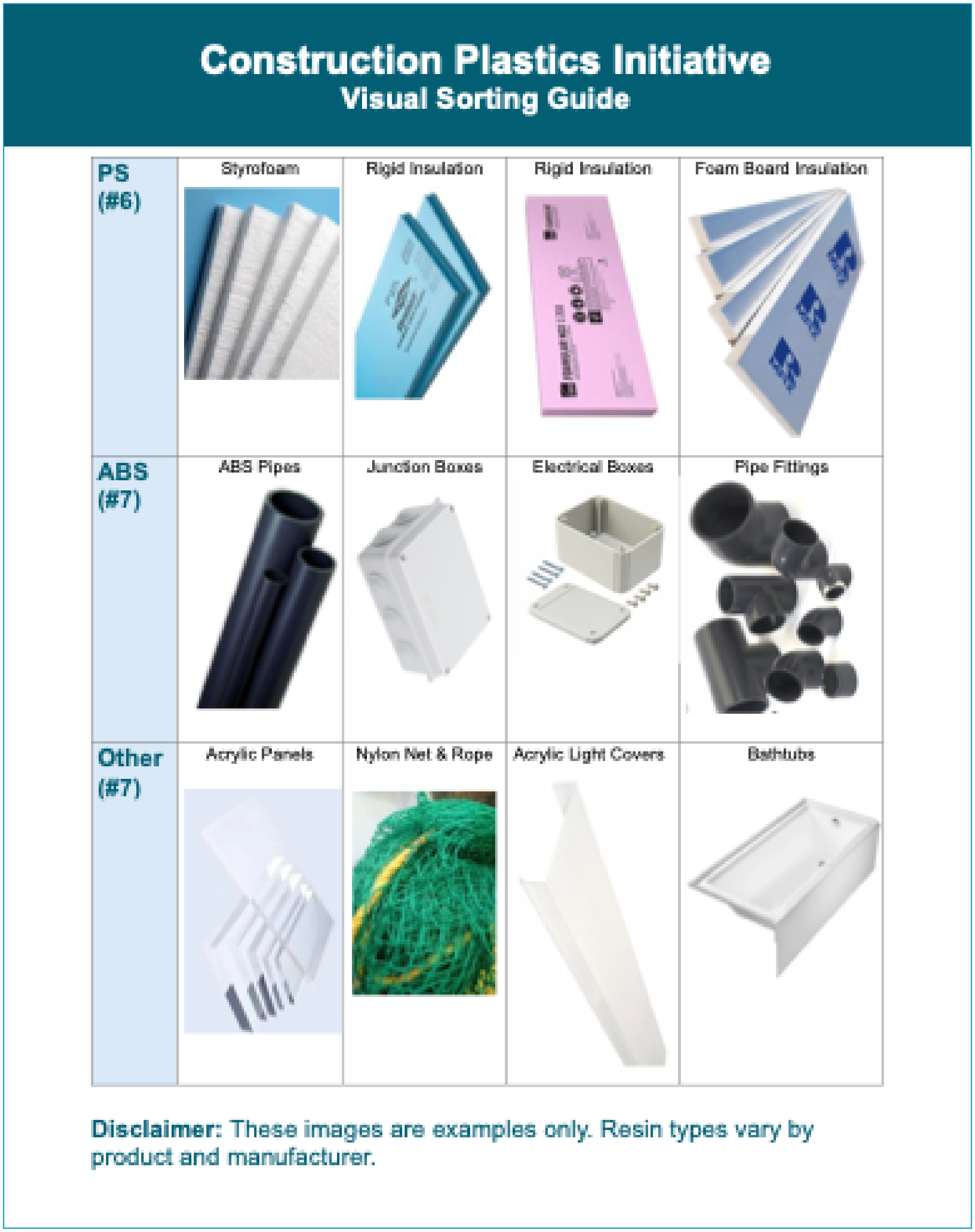
- ✗ Non-Plastic Items (e.g., Wood, Cardboard, Metal, Glass)
- ✗ Contaminated or Dirty Plastics
- ✗ Adhesive & Sealant Tubes
- ✗ Electrical Wire, Cables
- ✗ Hazardous Materials
- ✗ Food Waste, Organic Materials

✓ Paint Containers – Must Be Placed In Separate Collection Tub

Recycling Location: Look for the plastics bin and collection points throughout the site, marked with signs. Ask your supervisor or site staff if unsure.

Appendix C: Visual sorting guide

The following visual sorting guide was provided to sorting facility staff to assist with the classification of different resin types.


Construction Plastics Initiative
Visual Sorting Guide
PS (#6)
Styrofoam
Rigid Insulation
Rigid Insulation
Foam Board Insulation
ABS (#7)
ABS Pipes
Junction Boxes
Electrical Boxes
Pipe Fittings
Other (#7)
Acrylic Panels
Nylon Net & Rope
Acrylic Light Covers
Bathtubs
Disclaimer: These images are examples only. Resin types vary by product and manufacturer.

Appendix D: Resin glossary

Resin Type	Definition	Examples on construction sites
ABS	Typically, a rigid, opaque plastic with a smooth to slightly matte finish. Feels solid and impact-resistant, combining toughness with moderate flexibility. Chemically a blend of three components: acrylonitrile (chemical resistance and rigidity), butadiene (impact resistance), and styrene (surface finish and stiffness).	Pipe & fittings
BOPP **Biaxially Oriented Polypropylene**	Typically, a thin, smooth, and glossy plastic with a crisp feel. Feels lightweight yet strong, with high clarity and good resistance to moisture. Made from polypropylene that is stretched in two directions during manufacture, aligning the polymer chains to improve strength, stiffness, and surface finish.	Packaging, protective film
HDPE **High-Density Polyethylene**	Typically, a stiff yet flexible, opaque plastic known for its strength and low moisture absorption. Chemically composed of long linear polyethylene chains with very little branching, allowing the molecules to pack tightly, giving it strength, durability and resistance to chemicals.	Containers, packaging, pipe, slab sleeves, tool cases, buckets, hard hats, strapping, safety cones, safety fences
LDPE **Low-Density Polyethylene**	Typically, a soft, flexible, and slightly translucent plastic. Easily bent or stretched without breaking and highly resistant to moisture. Made from polyethylene chains with significant branching, preventing tight molecular packing and resulting in lower density, softness, and flexibility.	Clear film, ground cover film, lumber wrap, bags, poly sheeting, cling wrap, flexible foam, shrink wrap, sill gasket, pallet wrap, packaging, plastic wrap, tarps
Nylon	Typically, a strong, slightly flexible plastic with a smooth, low-friction surface. In construction it is valued for high mechanical strength, abrasion resistance, and load-bearing capability. Can absorb some moisture. Chemically composed of repeating amide bonds, creating a tough, wear-resistant material.	Rope
PC	Typically, a clear or translucent plastic with a smooth surface and solid, weighty feel. Extremely tough and impact-resistant while remaining rigid. Has good heat resistance and dimensional stability. Chemically made from carbonate groups linking polymer chains, which provides high strength and transparency	Polycarbonate panels, electrical boxes & switches

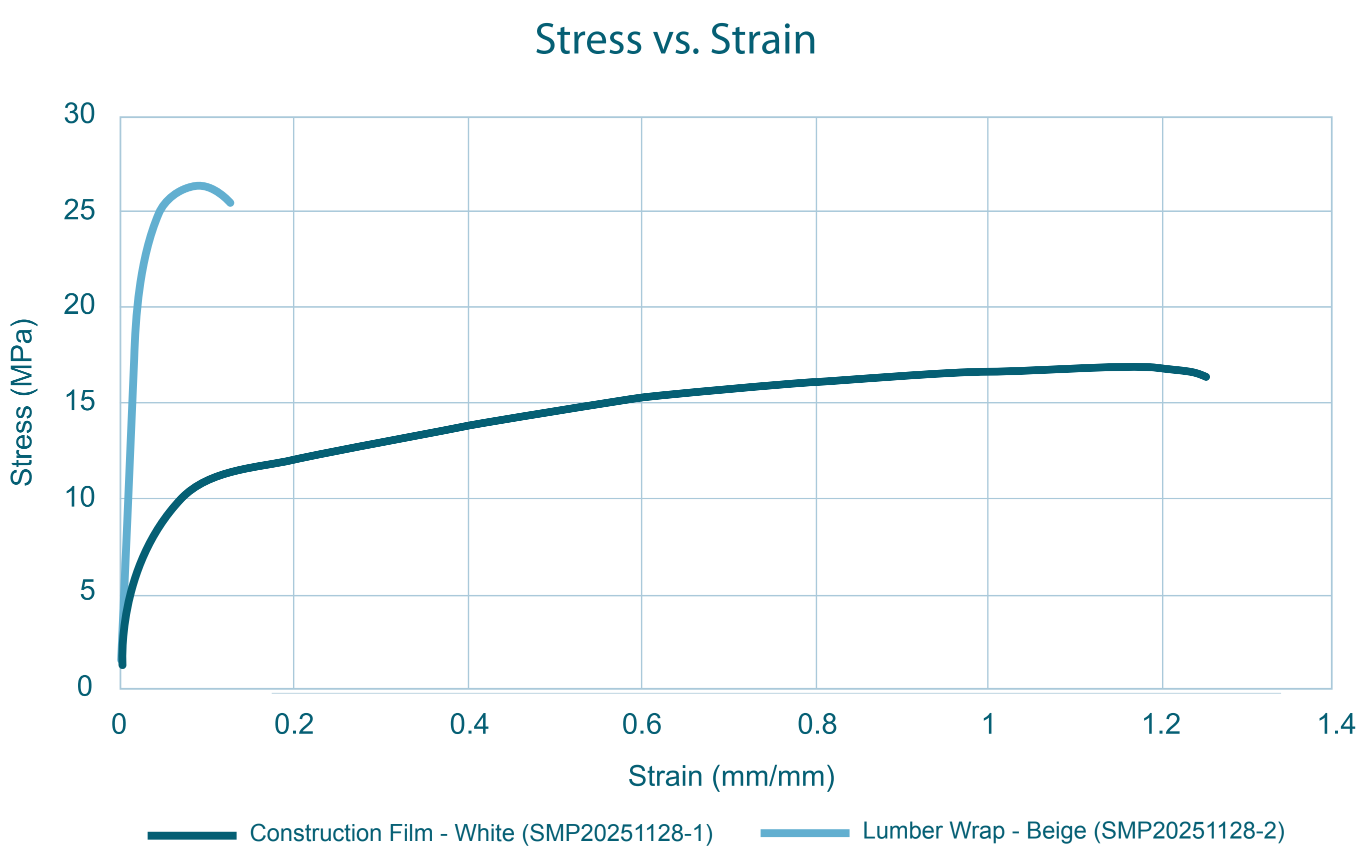
Resin Type	Definition	Examples on construction sites
PMMA (Acrylic) **Polymethyl Methacrylate**	Typically, a rigid, highly transparent plastic with a glass-like appearance and smooth, hard surface. Feels stiff and brittle compared to polycarbonates but offers excellent clarity and UV stability. Chemically composed of methyl methacrylate units, which give it optical clarity and resistance to yellowing.	Light fixture components
PP **Polypropylene**	Typically, a semi-rigid plastic. Feels lightweight yet tough, with good fatigue resistance and the ability to flex repeatedly without cracking. Has high heat resistance compared to other polyethylene resins. Chemically composed of propylene monomers, giving it a higher melting point and strong resistance to moisture and chemicals.	Lumber wrap, dimple board, surface protection, corrugated signs, corrugated sheets, protective fabric, strapping, rebar chairs, woven bags, wire spools, geo mesh
PET, PETE, PETP or PET-P **Polyethylene Terephthalate**	Typically, a clear, smooth, and glossy plastic with a hard, glass-like feel. Feels strong yet lightweight, with good stiffness and dimensional stability. Made from a polyester formed by combining ethylene glycol and terephthalic acid, which creates strong molecular bonds and good barrier properties against gases and moisture.	Soundboard, drink bottles, heavy duty strapping, geotechnical turf, slope stabilization nets, plastic mesh
PS **Polystyrene**	Typically, a rigid, lightweight plastic with a smooth, brittle feel in its solid form. Has good insulation properties and low impact resistance unless modified. Chemically made from styrene monomers, creating a stiff polymer structure. Exists in rigid form or as expanded foam with trapped air, which greatly reduces density.	Insulated concrete forms (ICF), void foam, Styrofoam, rigid insulation
PVC **Polyvinyl Chloride**	Typically, a rigid, hard plastic with high density, though it can also be flexible depending on formulation. Feels tough and difficult to crush, with excellent resistance to chemicals and weathering. Chemically made from vinyl chloride monomers containing chlorine, which contributes to its durability, flame resistance, and long life.	Pipes and fittings, connectors, electrical conduits, conduits, fence banners, vinyl flooring, soffit & fascia boards, trim pieces, delineators
XLPE	Typically, a firm, rubber-like plastic that feels tough and slightly flexible. Has excellent resistance to cracking, heat, and chemicals. Chemically similar to polyethylene but with molecular chains cross-linked together, forming a three-dimensional network that improves strength and thermal stability.	Electrical cables, PEX pipe

Appendix E: Processed recycled plastic mechanical analysis

Tensile Analysis

Tensile analysis was performed in accordance with ASTM D638. Five, Type I samples were tested for each material at a crosshead speed of 50 mm/min until failure occurred. The averaged results are listed below in Table 1 with a representative stress versus strain plot for a sample of each material found in Figure 1. As observed in the data, the white construction film exhibited a higher degree of toughness as compared to the lumber wrap material. This could be explained by the rubber-like consistency that can be used to characterize the material.

Table 1: Calculated tensile results for each material Sample	**Modulus / GPa (St. Dev.)**	**Yield Stress / MPa (St. Dev.)**	**Strain at Yield / % (St. Dev.)**
Construction Film (White (SMP20251128-1)	0.4 (0.04)	4.0 (0.33)*	0.9 (0.04)*



*0.2% offset method used in the calculation of these values

Figure 1: Example plot of representative samples for each material

Flexural Analysis

Flexural tests were performed in accordance with ASTM D790 Procedure B, Type II. Five samples were tested for each material using a crosshead speed of 14 mm/min and a span-to-depth ratio of 16:1, up until a 5 per cent strain was induced on the sample. Stress versus strain data could not be recorded for the white construction film due to load values being below the detectable limit of the load cell. Therefore, only data could be recorded for the beige lumber wrap. The averaged flexural modulus results are listed in Table 2 with stress versus strain data for all five samples of the lumber wrap illustrated in Figure 2.

Table 2: Calculated flexural modulus for each material Sample	**Modulus / GPa (St. Dev.)**
Construction Film (White)	Below detectable limit on load cell*
Lumber Wrap (Beige)	0.6 (0.04)

**Minimum detectable limit on load cell is 12 MPa*

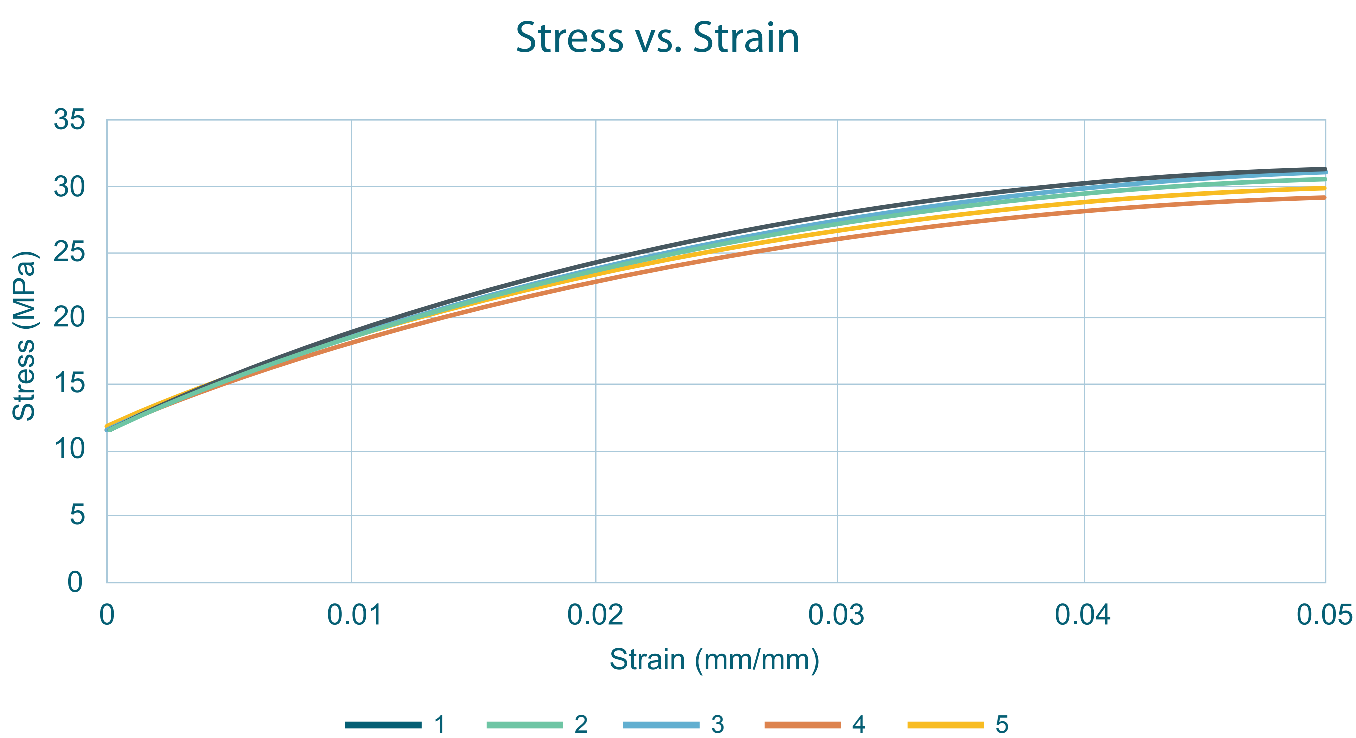


Figure 2: Flexural results for all five samples of the lumber wrap up to a 5% strain

Impact Analysis

Notch IZOD impact testing was performed in accordance with ASTM D256 Method A. Eight samples were tested for each material type, each impacted with 2.75 joules of energy. The results for impact strength and failure type are listed in Table 3. The impact results for the construction film are not considered valid in accordance with the ASTM standard due to the recorded failure type. This value is only listed in this report to demonstrate the extent of toughness exhibited by the white construction film over the lumber wrap material.

Table 3: Calculated impact strength and failure type for each material Sample	**Impact Strength / J/m (St.Dev.)**	**Failure Type**
Construction Film (White)	482 (29.0)[1]	Non-Break[2]
Lumber Wrap (Beige)	18 (0.9)	Complete Break[3]

1 As a consequence of its 'Non-Break' failure type, this value is not considered valid in accordance with the ASTM standard. It is only listed to illustrate the elevated toughness exhibited over the lumber wrap samples.

2 As defined in the ASTM standard, a Non-Break is an incomplete break where the fracture extends less than 90 per cent of the distance between the vertex of the notch and the opposite side.

3 As defined in the ASTM standard, a Complete Break is where the specimen separates into two or more pieces.